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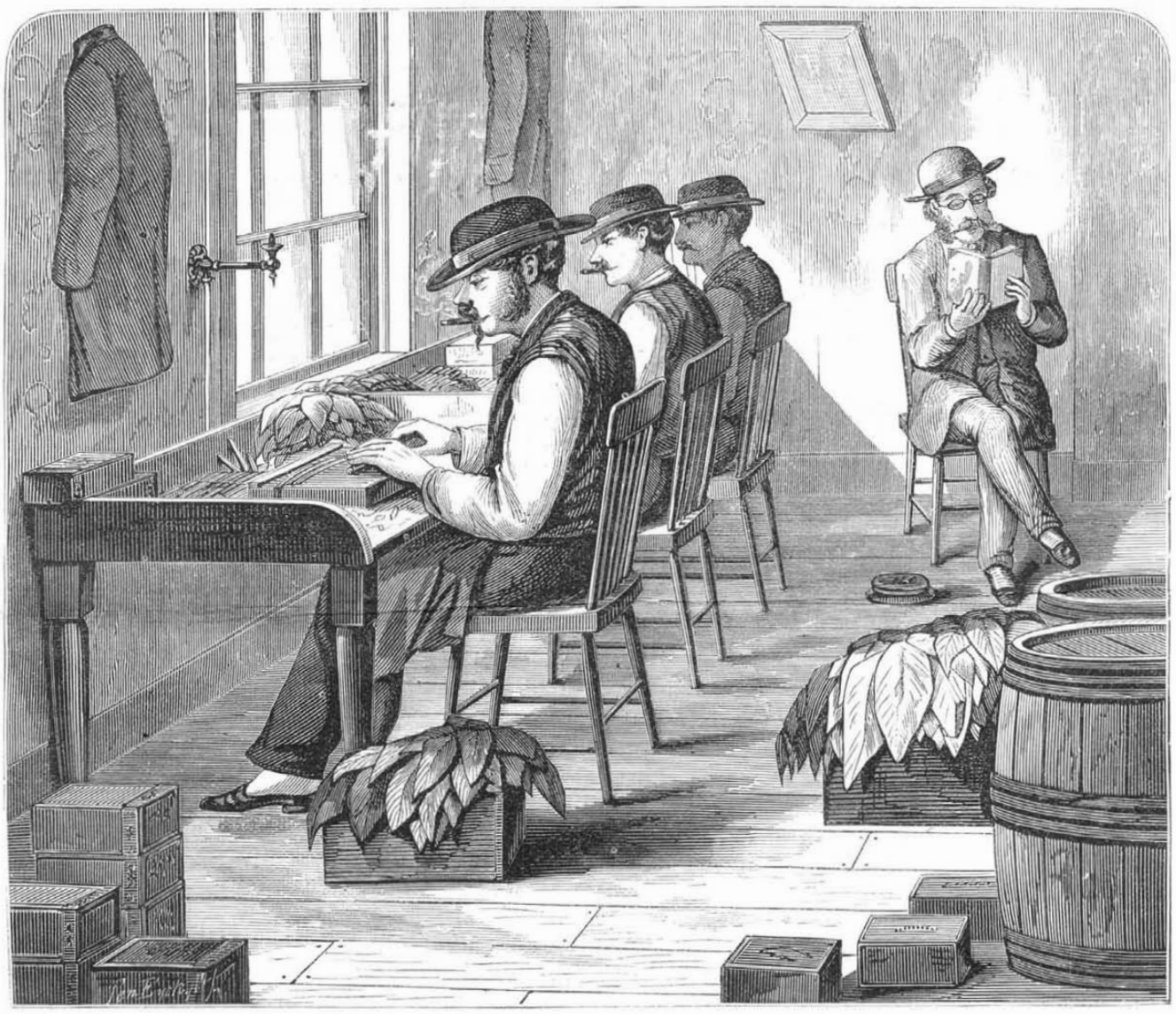
CIGAR MAKING.

Ever since the breaking out of the Cuban rebellion, the manufacture of cigars in this city, by exiles from the "ever-faithful isle," has been steadily advancing to the position of a staple industry. Numerous factories have been established which, although they employ hand labor solely, carry on successful competition with those in which the work is performed entirely by machinery. The tobacco used is imported directly from Cuba, and costs from three dollars to ninety cents per pound. American tobacco is not used, the manufacturers not agreeing in the general opinion that it makes the best wrappers.

On being received at the factory, the tobacco is first carefully inspected, in order to ascertain its quality, and the leaves or fillers, which are to be used for the interior of the cigars, are carefully examined. This consists in simply removing the large stem which passes through the center of each leaf. The larger and finer leaves used for wrappers, or outside coverings, are then treated in the same manner, and passed to the foreman who, after examining them, distributes them to the workmen who make the different varieties of cigars.

It is a noticeable peculiarity in this trade, that each man knows how to make but one kind of cigar. The workman who makes a *concha* cannot make a *regalia*, nor is he required to do so, nor can an *española* be rolled by the man whose specialty is the *partaga*. For the benefit of our non-smoking readers, we should mention, *en passant*, that a *concha* is a short thick cigar, its name being derived from its shape, having a fancied resemblance to that of a shell; the *regalia* is generally large in size and finely flavored; *española* takes its name from red and yellow ribbons, the colors of the Spanish flag, with which the bundles of the cigars of that brand are tied; and, finally, a *partaga* is of large size, rather long, and is named from the owner of the manufactory in Havana at which the variety was first made. Of course, there are countless other brands, all christened with different names, according to the fancy of their makers, but those above mentioned may be considered the principal ones and the most generally recognized throughout the trade.



CIGAR MAKING.

Our artist has represented the workmen in the act of rolling the cigars. The process, although very simple and apparently remarkably easy to perform, nevertheless requires the greatest skill and long practice. The men are seated in rows, each one having before him, on his table, a thick slab of hard wood, and on either hand a heap of dampened leaves, consisting respectively of wrappers and fillers. A wrapper is selected, smoothed on the slab until it is free from creases and wrinkles, and then cut with a peculiarly shaped knife, somewhat resembling that used by shoemakers in trimming soles, into a nearly semicircular form. The workman then takes as many of the short leaves, to be use as fillers, as he thinks will make the cigar, in his left hand, and squeezing them into a loose bundle, places them on the wrapper before him. By a dexterous twist, the edges of the latter are brought up, a quick roll is given to the whole, and the bundle is tightly enveloped. The end for the mouth is now carefully manipulated into the required conical shape, and the point secured by a drop of paste; the other extremity is cut off smooth. The cigar is then placed on the slab, rolled a few times under the flat of the knife blade, and it is ready for smoking. This process, of course, requires a much greater expenditure of time than if the cigars were merely pressed into molds, but it has been found that those made in the latter manner have the defect of not burning evenly, and are besides inferior in many other respects.

Messrs. Mora & Co., one of the largest manufacturing firms in this city, inform us that the workmen are paid according to the number and quality of the cigars they roll. Makers of *regalias* receive $20 per thousand, of *conchas* $20, and of *españolas* $18. An ordinary quick worker will finish two hundred cigars per day, and as many as four hundred are made by the oldest and most experienced hands. The men are all Cubans, and some of their customs would doubtless seem odd to an American workman. They club together, contributing twenty-five cents a week each, with which they hire a fellow exile to read aloud to them during their work. The position is no sinecure, for the reader is expected to keep up an incessant flow of words from 7 A. M. to 6 P. M., with the exception of one hour's rest for refreshments. The workmen thus become posted in the news of the day, and in addition occasionally listen to the perusal of Spanish history, or some work of fiction. There is another tax which they impose upon themselves, to the payment of which they religiously adhere, which is to lay aside a certain sum every week from their wages, to be sent to their struggling compatriots in Cuba, for arms and supplies.

The sorting of the different kinds of cigars, as regards strength, is carried on by another set of workmen, who seem to be possessed of the most unerringly delicate judgment. Standing before a heap of cigars, thrown indiscriminately on a table, they pick them out one at a time, hold them so that the light will fall on them from a certain point, instantly tell their exact grade of strength, and toss them to their proper heaps in almost a single motion and with incredible celerity. If the cigars are to remain cylindrical in shape, they are then tied in bundles, another proceeding requiring considerable manual skill. The ribbons to be used in fastening the bundle together are first stretched out on the table, and the cigars heaped upon them in quantities of twenty-five or more. The workman then takes the ends of the ribbons, brings them together, gives them another of those indescribable twists, ties the knots, and drops the bundle into the box in less time than it has taken to pen this sentence. The bundle, however, is a little too large for its case, and consequently has to be forced in by a screw press; the cover is then nailed down, the Government stamp affixed, and the box is ready for the market. In case, however, it is desired to press the cigars into those irregular triangular or quadrangular forms in which they are sold, they are first dampened, then packed in bundles, and finally enveloped in strong wet paper. The latter, in drying, forces the cigars together, causing them to assume the required shape.

The stems and refuse of the tobacco are not used. The odd ends or cuttings of the manufactory are sold in bulk for filling for cheap cigars, the wrappers of which are generally Connecticut leaf.

Steam Street Car.

The Remington steam street car, from Ilion, N. Y. (Baxter's patent), heretofore described in the SCIENTIFIC AMERICAN, was recently brought to this city, and has been successfully tried on the track of the Bleecker street railway. This road runs through the most crowded and difficult parts of the city, its curves are sharp, and its grades unusually heavy; it is safe to say that any steam car that can pass over its track is able to meet the requirements of all city railway traffic. Some of the curves of the Bleecker street line are less than 50 feet radius, while there are grades as steep as 1 in 13. There are also innumerable crossings of other tracks to be passed, so that the difficulties presented to the steam car, on this line, are unusual.

We are happy to say that the Remington car has proved a decided success. On the recent trial it easily turned the sharpest corner, and on the top of the steep grade in Elm street it was stopped, reversed, and backed down the declivity, returning without the slightest hindrance. It is of the size of an ordinary street car, and has nearly the same appearance: the machinery, embracing a compound engine of five horse power, occupying the front platform, which is also provided with a box containing coal enough for half a day. A conductor and engineer only are required to run the car, which can be stopped very quickly by suddenly reversing the engine. With a light load and on a straight track, it is said to have run at the rate of twenty-five miles an hour.

Krupp's Steel Works.

The establishment of F. Krupp, at Essen, Prussia, manufactured last year 150,000,000 pounds of cast steel, against 130,000,000 in 1870; 8,810 workmen, and engines amounting to 9,595 horse power, are employed. Five hundred and twenty-eight furnaces for smelting, heating and converting; 169 forges, 260 welding and puddling furnaces, 245 coke furnaces, 130 various other furnaces, 342 turning lathes, 130 planing machines, 73 cutting machines, 172 boring machines, 94 grinding benches, 209 various other machines, 174 steam boilers, 265 steam engines (from 1,000 horsepower downward), and 58 steam hammers (from 30 tuns downwards), are in use. The various articles manufactured consist of axles, wheels, tires for railroads, rails, springs for railroad and tramway cars for mines, axles for steamships, boiler plates, rollers, tool steel, cannon, gun carriages, etc.

COATS, the celebrated English thread maker, has moved his establishment to this country, and at Pawtucket, R. I., now has a large thread factory where he employs three hundred persons.

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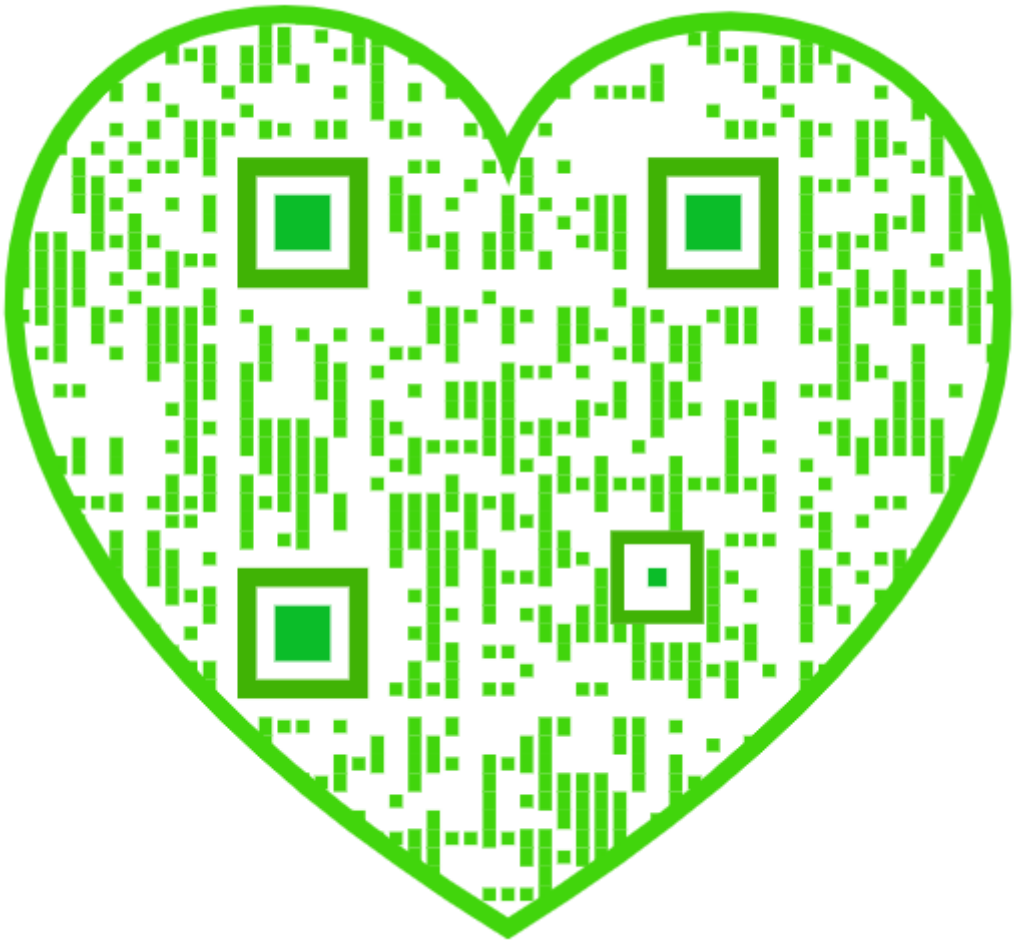

THE INSTITUTION OF CIVIL ENGINEERS.

The following list of subjects for papers for the Session 1872-73, has been issued by the Council of the Institution of Civil Engineers, London, who invite communications dealing in a complete and comprehensive manner with any of the subjects comprised therein, as well as upon others, such as:—

a. Account of the Progress of any Work in Civil Engineering, as far as absolutely executed (Smeaton's Narrative of the Building of Eddystone Lighthouse may be taken as an example.)

b. Descriptions of distinct classes of Engines and Machines of various kinds.

c. Practical Essays on Subjects allied to Engineering, as, for instance, Metallurgy; and

d. Particulars of Experiments and Observations connected with Engineering Science and Practice.

LIST.

1. On the Application of Graphic Methods in the Solution of Engineering Problems, and in the Reduction of Experimental Observations.

2. On the Elasticity, or Resistance to Deflection, of Masonry, Brickwork, and Concrete, with observations on the Deflection of the tops of Bridge Piers, by unequal loading of the Arches abutting on them.

3. On the Methods of Constructing the Foundations of some of the Principal Bridges in Holland and in the United States.

4. On bridges of large span, considered with reference to examples, now in progress or recently completed, in the United States; including an account of the testing, and of the effects produced by variations of temperature.

5. On the Theory and Practical Design of Retaining Walls for sustaining earth or water, and on experimental tests of the accuracy of the various theories.

6. On the Different Systems of Road Traction Engines, with details of the results in each case

7. On the Use of Concrete, or *Béton* in large masses, for Harbor Works and for Monolithic Structures.

8. On Dredging Machinery, and on the cost of raising and depositing the material.

9. On the Appliances and Methods for Rock-boring and Blasting, in this country and abroad, and on the results obtained.

10. On the Gage of Railways.

11. On the Systems of Fixed Signals on Railways, and on the connection between the signals and the points.

12. On Modern Locomotive Engines, designed with a view to economy, durability, and facility of repair, including particulars of the duty performed, of the cost of repairs, etc.

13. On the different Systems for Surmounting Inclines on Mountain Railways.

14. On the various Modes of Dealing with Sewage, either for its disposal or utilization.

15. On the Separate System of Sewering Towns, with a detailed description of the works in a town to which this system has been wholly or partially applied, and particulars as to the results.

16. On the Ventilation of Sewers, with a *résumé* of the Experiments as to the motion, pressure, etc., of Gas in the Sewers.

17. On the Constant Service of Water Supply, with special reference to its introduction into the metropolis, in substitution for the Intermittent system.

18. On Street Railways and Tramways through Cities and Towns, and on the best mode of working them.

19. On the Application of Steam as Motive Power for pumping Water or Sewage, with a comparison of the advantages of different classes of Engines, and details of the cost of working for long periods.

20. On the various descriptions of Pumps employed for Raising Water or Sewage, and their relative efficiency; and on the employment of Water as a Motive Power for pumping, by means of Water Wheels, Turbines, Water Pressure Engines, or other Machines.

21. On the Employment of Steam Power in Agriculture.

22. On the laws governing the Flow of Steam and other Gases through Orifices, Pipes, etc., and on Experiments to determine these Laws.

23. On the Methods of Transmitting Force to distant points.

24. On the best practical Use of Steam in Steam Engines, and on the effects of the various modes of producing Condensation.

25. On the modern practice of Marine Engineering, having reference to Economy of Working Expenses, by Superheating, Surface Condensing, great Expansion, High Pressure, etc.

26. On the Present State of Science in regard to the Manufacture of Gas for the purposes of Illumination.

27. On the Construction of Sluices, for the expeditious filling and emptying of Locks of large size on navigable Canals.

28. On the Harbor and Dock Works at Spezzia.

29. On the Maintenance, by Sluicing, of the Harbors on the Coasts of France, Belgium, etc.

30. On the Practice and Results of Irrigation in Northern India.

31. On the Sea Works at the mouth of the Adour, and the effect produced by them on the bar of that River.

32. On the Sea Works at the mouth of the River Maas, and the effects produced thereby.

33. On the Manufacture of Iron and Steel as now pursued, the effect on strength and tenacity of the admixture of substances with the Ore, and any test, other than fracture, by which the quality may be ascertained.

34. On the various Methods of Draining distant isolated sections of Mines.

35. On Compressed Air as a Motive Power for Machinery in Mines, with some account of its application on the Continent.

36. On the Use of the Diving Apparatus in Mines, especially in Westphalia and in Germany.

37. On the Systems and Apparatus at present used in Telegraphy.

For approved original communications, the Council will be prepared to award the Premiums arising out of special funds devoted for the purpose. They will not, however, consider themselves bound to make any award, should there not be any communication of adequate merit; but on the other hand, more than one premium will be given, if there are several deserving memoirs on the same subject. It is to be understood that, in this matter, no distinction will be made between essays received from a Member or an Associate of the Institution, or from any other person, whether a native or a foreigner.

The communication should be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, on the one side only, leaving a sufficient margin on the left side, in order that the sheets may be bound. A concise abstract must accompany every paper.

The drawings should be on mounted paper, and with as many details as may be necessary to illustrate the subject. Enlarged diagrams, to such a scale that they may be clearly visible when suspended in the Theater of the Institution, should be sent for the illustration of particular portions.

Papers which have been read at the meetings of other societies, or have been published in any form, cannot be read at a meeting of the Institution, nor be admitted to competition for the premiums.

The communications must be forwarded, on or before the 31st. December, 1872, to the house of the Institution, No. 25, Great George Street, Westminster, S. W., London, where any further information may be obtained.

[American Journal of Pharmacy.]

A NEW APPLICATION OF TUBE HYDROMETERS.

BY WILSON H. PILE, M. D.

A plain cylindrical tube of thin glass, closed at its lower end, is to be immersed in pure water, at a temperature of 60° F., and then loaded by pouring in shot or mercury until it sinks about two thirds of its length in the water, the point to which the surface of the water rises being then marked on the tube. If now that part of the tube which was immersed in the water be divided into 145 parts, and these parts numbered from the top downwards, the tube will represent a Baumé's hydrometer for liquids heavier than water; and by floating it in any liquid of greater density than water, its degree will be seen on the tube at the surface of the liquid.

These degrees can be marked on paper, and the paper inserted in the tube and pushed down to the bottom, the upper mark or zero being exactly opposite the mark which had been previously made on the tube.

We will now proceed to show a new application of these tube hydrometers in determining densities.

Having immersed a tube, closed at the lower end as before, in water, we pour water into the tube until it sinks about $\frac{2}{3}$ of its length.

It should float upright. We are now to mark the surface of the water in which the tube floats, and also the surface of the water within the tube. The tube below this latter mark must then be divided into 145 parts, either by etching on the glass or, what is more practical, by drawing a scale on paper, numbering the degrees from the top (0°) downwards. In ascertaining the density of any liquid heavier than water, the tube must be emptied and dried by rinsing with alcohol and drawing air through it by means of a long tube, then immersed in water of 60° F., and the liquid to be tried poured in until the tube sinks to the upper mark. It can then be taken out, and the degree of density shown on the tube, if it be etched, or else by holding it on the paper scale in its proper position.

Our illustrations have been thus far for liquids heavier than water; for those lighter than water, the tubes or scales require a different division. Unfortunately, Baumé's method of dividing his hydrometers rendered the degrees of those for light liquids larger than those for heavy liquids, and by comparison we find that they are in the ratio of 145 to 140. In order, therefore, to make a scale for light liquids, we divide the space below the surface of the water within the tube into 140 parts instead of 145 parts, as at first; the degrees are then continued upwards 70 or more parts. These divisions are numbered at the water point 10° (another peculiarity of Baumé's scale), and running upwards so high as desired. The scale below the water point need not be marked, as it can be only used for liquids lighter than water.

The tube is used for all liquids in the same manner, namely, by pouring into it the liquid to be tried until it sinks in water down to the mark made at first on the tube; then by holding it against the paper scale marked as just described. The surface of the liquid will indicate its proper degree of density.

An advantage which the tube possesses, when used in this manner, is the small quantity of liquid necessary, as the tube can be made quite small in diameter, and by increasing its length the degrees are rendered larger, and thus greater accuracy is obtained. It may also be employed in ascertaining the density of extremely heavy liquids, where no hydrometer could be found of service.

Before you ask a favor of any man consider three things. First, can you not avoid it? Second, can the one you apply to grant it? Third, would you, if your places were reversed, do for your friend what you ask him to do for yourself? It is well to think of this, as it may change the whole question.

The Great Fire of Boston.

In a discourse on the Sunday evening after the fire, Mr. Henry Ward Beecher, of Brooklyn, N. .,N made the following observations, which are full of interest and common sense: Last year it was Chicago that was destroyed: now it is Boston. The West and the East are at last united by a common calamity. Boston is thoroughly identified with the whole history of this country, for from it sprang all that is great and good of American ideas. The earliest heroes of liberty were from there; the war of independence began there; it was from there that Jefferson sought the Adams who aided him in making the laws for the newly-formed Republic. Boston has always been the true head of the nation, and never flinched at the call of liberty. American history began in Boston, which city has never ceased to be the brain of the country for knowledge, liberty, and religion. Boston never went back from its duty when other cities swerved from theirs. Hated she may have been by some, but there is not a city in the United States that is not indebted to her for schools, literature and scholars, from the earliest day of the Republic to the present time. No other city of the Union ever gave such a common school education to all as Boston has done; from the highest to the lowest grade, education has she willingly given to her poorest son or emigrant resident. God could not have laid the heavy hand of fire on a city more noble than this. It is a national calamity. Some may say the disaster was sent to humble their pride or their avarice. If such were the case, no city would escape. Under such Providence, where would New York and Brooklyn be? With such a law no spot on the earth ought to be saved. Such an assertion is presumptuous, it is audacious. A sparrow cannot fall without God's knowledge; yet sparrows do fall. Such remarks are in defiance of God's wisdom and equity. Instead of making them, we should take lessons from the disaster, for it teaches a great deal. It teaches us that, in the construction of streets, individual rights should not set at nought the general interests. Why were the streets so narrow? This fire was no accident, for it will be found that it followed a general law throughout. The plague, fever, and fire were the best architects of the London of to-day, and also of many other cities. The fire teaches Boston that it is not needful or wise to have narrow streets to convey the flames from one side to the other, or to act as horizontal funnels to carry the fire from one block to another. But the answer will be that the streets have been so for a hundred years, and there has been no fire. Is it necessary to have such a fire even once in a century? This fire will show that it is not needful to build houses four or five stories high of fireproof granite, and then surmount them with an inflammable box, out of the reach of firemen, for the fire devils to sport in and scatter their sparks all over the city. Architects could not see this result, and bitterly the city is now paying for the experience. Other cities not far from here may also have to pay as dearly for their parsimony in erecting buildings. Why not make every business house a separate fire department? We can carry light and water in the hollows of walls to any part of a building we choose. Why not have the means of extinguishing incipient fires also built in the hollows of walls, and each man in the place a fireman?

American Nickel.

In the arts, nickel is rapidly growing into favor as a substitute for silver in plating steel, iron and other metals. Its commercial demand is rapidly increasing, and as it is much cheaper than silver, it will undoubtedly be adopted in the manufacture of many articles as a substitute for that more precious metal. One mine, the Mine La Motte tract, Missouri, was worked from 1850 to 1855. The ore was the sulphuret, associated with lead and copper. About $100,000 was realized from the croppings of the vein. Croppings of nickel ore are found also in Madison, Iron and Wayne counties, Missouri. The refined metal is worth $3 per pound. For small coins, it is very useful. The principal supply is at present derived from a single mine in Lancaster county, Pa. It has been worked for seventeen years, and developed to a depth of 200 feet. The length of this lode is between two and three thousand feet, and it produces from four hundred to six hundred tuns per month, employing in the working of the mine a force of 175 men.

A CRIPPLED rogue in Philadelphia has found a new use for an artificial leg. He worked in a pipe factory and was in the habit of filling his porcelain limb each day with a choice assortment of meerschaums, which he disposed of on his own account. When discovered, he had made about $800 by this illegitimate traffic. In this way he was walking off with a goodly share of the profits of the establishment.

CALIFORNIA does everything on the biggest sort of a scale. A bee hive in the rocks in Los Angeles county is reported, and is said to be 160 feet deep, entrance 30 feet wide and 17 feet deep; it contains several tuns of honey. In fact the sweet liquid runs, on warm days, in a small stream from the hive, from which the settlers supply themselves.

A MAINE sea captain suggests that telegraph wires be extended to all the lightbouses on the coast, and that a system of signals be arranged to be exhibited from the lighthouses to give notice to passing vessels of approaching storms or changes of wind. The idea is a good one.

CELERY, as an article of dish, is highly recommended for nervousness. A correspondent says he has known persons cured of nervousness, whose hands shook like aspen leaves. He recommended the daily use of it at meal times.

SEVEN patents have been granted for policeman's clubs.

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REMARKABLE STRUCTURES OF THE ANCIENT AMERICANS.

In a review of the work on "Ancient America," by John D. Baldwin, the London *Athenæum* says: Not many perhaps, of those who habitually speak of the "Old and New Worlds" as a geographical expression fully realize the idea of a dual world of civilization and progress; yet it is certain that, side by side with that of Egypt and Assyria, there grew up in America another culture, equal, at one time, in art, power, and extent, and although, in so far as our existing evidence enables us to judge, unconnected, yet greatly resembling in system that on which our own civilization has been established; and were it not that these two cultures unfortunately came in contact during the climax of Spanish ecclesiastical bigotry and intolerance, the so called new world might have boasted of an ancient history corresponding to our own. So completely, however, has the law of the survival of the strongest asserted itself under the influence of the monkish exponents of Christianity—so effectually did they succeed in snuffing out all trace of art and culture amongst the people whom they had conquered—that writers may now be found who, in the face of the evidence afforded by ruined cities, palaces, aqueducts, and paved roads, deny the claim of the American continent to any ancient civilization higher than what might have been derived from the wild Indians, such as the Iroquois and the Algonquins, whom the Pilgrim Fathers encountered in the seventeenth century. Such views as these receive no support from Mr. Baldwin. The relics of ancient American civilization are to be found in these separate but nearly contiguous areas situated near the point of junction of the two continents.

Commencing with the northernmost of these divisions, commonly known as the region of the mound builders, we find in the neighborhood of the lakes, at the northern apex of the triangular region above mentioned, in Michigan, Iowa, Missouri, and particularly in Wisconsin, a tract of country characterized by the presence of large mounds designed in the form of animals, birds, serpents, or men, in huge relievos. Next to this we have a district of which the State of Ohio may be regarded as the nucleus, but which occupied the whole valley of the Ohio and its tributaries, extending into Western Virginia, Indiana, Michigan, Illinois, and Missouri. The special characteristics of this area consist of pyramidal mounds, usually from six to thirty feet high, but rising in some cases to sixty and ninety feet; they were generally square or rectangular, and were ascended by winding staircases on the outside. This district is also remarkable for lines of entrenchment, from five to thirty feet high, inclosing usually from one to thirty acres, but extending at times to 100, 200, and even 400 acres. They frequently consist of combinations of square and circular figures, the accuracy and perfection of which prove, as Messrs. Squier and Davis have remarked, that the builders possessed some standard of measurement, and had the means of determining angles. There are no less than 10,000 of these mounds and 15,000 inclosures in Ohio alone. Lower down in the valley of the Mississippi, and along the fertile plains bordering the Gulf of Mexico, and to westward over the Rio Grande, the inclosures are smaller and less numerous, and the mounds, though of the same character and more plentiful, are lower, and consist of truncated pyramids and pyramidal platforms. Broad terraces, elevated passages, aguadas or artificial ponds, and the use of sun-dried bricks, are peculiar to this region, the remains of which approach more closely in character to those of Central America than the ruins to the northward. Taken as a whole, the mound builders appear to have been inferior in culture to their Central American and Peruvian neighbors. They were an agricultural people: yet they made use of spun cloth, their pottery was in some cases almost equal to that of Peru, and there are grounds for supposing that they had a knowledge of astronomy. Their tools and other relics were composed of copper, silver, porphyry, greenstone, and obsidian. Metallurgy, in the proper sense of the term, does not appear to have been introduced amongst them, for their copper tools were beaten into form, and contained in some cases blotches of silver just as it is found in the matrix in the pure state on the shore of Lake Superior, where they worked it in open cuttings from the surface.

Turning to Mexico and Central America, we find here also the antiquities of this central region distributed in three distinct areas. In Chiapa, Tabasco, Oxaca, Yucatan, Honduras, Tehuantepec, and Guatamala, the ruins consist of stone-built cities of great extent, palaces richly ornamented, and standing upon raised platforms similar to those found in the lower portion of the Mississippi valley, in all probability, severed the same purpose. Most of these ruined cities are thickly overgrown with trees; and it is known that other cities lie buried in the forest districts, which have been as yet but little explored. More is known respecting the Mexican area from its having been the center of Aztec civilization at the time of the conquest; and though some doubt has been thrown upon the accounts of the city of Mexico given by the Spaniards, it is certain that a comparatively high state of civilization, although inferior to that of Central America, existed in the valley of Mexico at that time. Their city had considerable architectural pretensions, and their temple was a rectangular terraced pyramid, ascending by a flight of steps on the outside, like the pyramids of the mound builders; but they did not possess the phonetic alphabet of the Central Americans, and their records consisted of picture writings.

The third sub-division of this central area is found in New Mexico and Arizona amongst the Pueblo Indians, the chief characteristic of whose culture consists in their residence in large communal buildings, each of which contains an entire town or village of small rooms ranged in three or four stories above each other, forming a huge rectangular structure not altogether unlike some of the great edifices in the ruins of Central America, such as the palace of Palenque or the Casa del Gobernado at Uxmal, but yet differing from them both in character and purpose. These buildings were in use at the time of the conquest, and are still inhabited in some places. The Pueblos are vastly superior in culture to the wild tribes of Indians on the north, with whom they are constantly at war.

The Peruvian ruins consist of cities, palaces, fortresses, aqueducts, one of which is 450 miles long, and great paved roads, admirably constructed throughout the whole length of the empire, which latter were originated during the earlier civilization, and restored by the Incas. Their work was admirably done; but it is everywhere seen that their masonry, although sometimes ornamented, was generally plain and massive in style. They had no inscriptions, though it is thought that at the time of the conquest they possessed the art of writing in hieroglyphics. Their temples were not high truncated pyramids, and their great edifices were not erected upon terraces, as in Central America; but the doors in the older buildings around Lake Titicaca had the peculiarity of being narrower at the top, like some of the prehistoric structures of Europe. Their tools were of bronze; but it has been conjectured that, although iron was unknown in the times of the Incas, it may have been employed in the earlier times, as that ore is abundant in Peru, and some of the existing languages, if not all, have names for the metal. In their knowledge of astronomy, they appear to have been inferior to the Central Americans.

The antiquity of the mound builders is established by the growth of forest surmounting their remains. In the *débris* covering the ancient copper mines of Lake Superior, trees showing 395 rings of annual growth have been found growing; and Sir Charles Lyell counted 800 rings in the trunk of a tree growing on one of the mounds at Marietta. It is evident also, in both cases, that several generations of trees have preceded those now standing in the soil. In the valley of the Mississippi, four terraces are usually seen, marking four distinct eras of subsidence since the river began to flow. The ancient works, mounds and enclosures are found on all these terraces, except the fourth or lowest; showing that this last terrace, which probably marks the longest period of any, was formed since the works were erected. Some of the mounds have also been destroyed by streams that have since receded more than half a mile, and which, at present, could not reach them under any circumstances. The antiquity of the latest relics of the mound builders is further confirmed by the state of decay in which all the skeletons of these people are found. Although the soil is not unfavorable to their preservation, only one or two skulls have been found in a condition to be restored. In Central America, similar evidence of great antiquity is afforded by the growth of timber, and by the fact that everythiug perishable has disappeared, except the lintels of some of the doors of the more modern structures of Yucatan.

In Peru, Mr. James Wilson found, at various points on the coast near Quito, ancient pottery and other manufactured articles finely wrought, and some of them of gold, beneath a marine deposit of six feet, having trees growing on the surface which were older than the Spanish invasion; which proves that this land must have been submerged beneath the ocean and again elevated to its former position since these relics were deposited.

Decisions of the Commissioner of Patents.

Improvement in Lubricators.

T. W. GARRATT *vs.* N. SIEBERT.—*Interference.*

The one first to invent a new and useful device is entitled to the protection of a patent, even if its production was accidental and not appreciated at the time. Priority awarded to Garratt.

Woven Wire Mattresses.

G. C. PERKINS.—*Appeal.*

Application of Geo. C. Perkins for patent for WOVEN WIRE MATTRESSES.

LEGGETT, *Commissioner:*

Applicant claims—

1. A wire mattress or cushion having a web of coiled springs linked together in pairs, substantially as described.

2. A wire mattress or cushion having a web of coiled springs linked together in sets of three or more, substantially as described.

3. A fabric of spiral wire springs interlocked two and two or three and three, substantially in the manner herein described.

The references show, in the case of Rouillion, a mattress made by placing one coiled cushion, composed of single wire coils, over another similar one and interlocking the two; and in the case of Leemann, a mattress composed on the margin of double coiled wires and in the middle of single coiled wires. This plan it was supposed would give sufficient strength and save the extra material and cost of making the whole mattress of double wire coils. If it did not, as a matter of course the double coils would be further employed, either to wholly or in part compose the center of the cushion. Once the plan being adopted of employing double coils in the manner shown, to give additional strength, how many or how few to use, becomes simply a matter of judgment. The same of the number of wires employed in each coil. After two have been used, and a third can be employed in the same by simply adding it to the strand, there is no more invention involved in so adding it and forming a stronger cushion than there is in driving an additional nail when there are no difficulties in the way and two are not sufficient to hold. Applicant has invented nothing. He has done nothing more than to make a stronger mattress than Leemann did by employing more double coils than he did precisely as he did, there being no difficulty to overcome in so doing.

Application rejected.

Tubular Legs for Portable Furnaces.

Application of DeWitt C. Baxter for patent for PORTABLE FORGE.

LEGGETT, *Commissioner:*

The claim on which the appeal was taken is as follows—

The combination of the hearth plate of a portable furnace with wrought iron tubular legs connected together, all substantially as set forth.

The improvement which applicant has made in portable furnaces—and I have no doubt he has made one—consists in supporting them upon hollow wrought iron legs, whereby sufficient strength is obtained in the legs and at the same time they are rendered lighter than those heretofore made of solid cast iron. But the difficulty is, as the Examiner says, that the improvement "does not indicate in any degree invention." It is simply the result of the exercise of that judgment and the application of that knowledge—in view of the fact that wrought hollow tubes are used in so many analogous situations where strength, lightness, and economy of material are requisite—which is expected of every competent mechanic. In a less developed state of the art of making and applying tubular legs and supports it is possible a patent, such as applicant seeks, might be legally granted, but not now. The references cited by the Examiner are in point as showing the various applications of tubular supports analogous to applicant's, and exhibiting his as barren of invention.

The decision of the Board is affirmed. Application rejected.

Decisions of the Courts.

United States Circuit Court, District of Massachusetts.

SANFORD *et al. vs.* MESSER *et al.*

This was a suit in equity upon letters patent granted April 10, 1866, upon the joint invention of Frederick S. Sanford and Dwight Wheeler, assignors to Glover Sanford & Sons and Dwight Wheeler, relative to improvements in sewing machines, and designed to adapt the ordinary sewing machine to the work of sewing sweat linings into hats. Glover Sanford and others complainants, and Matthew Messer and others defendants.

The main points of the defense were: First, that the patent was void for lack of novelty in the invention; second, that the bill was defective for want of parties, it appearing that the complainants had parted with the exclusive right to *use and vend* the patented improvement in and for the State of Massachusetts, which made it necessary, it was urged, that the guarantees of this right should be joined as complainants.

SHEPLEY, *Judge:*

This is a suit in equity founded on letters patent granted by the United States "for a new and useful improvement in sewing machines, applicable to the ordinary sewing machine, by which it may be adapted to sew sweat linings into hats without any alteration in the organizations of such machines."

An objection is made that the bill is defective for want of parties. Defendants claim that since the date of the patent the plaintiffs have transferred such an interest, in the patent in and for the State of Massachusetts, that they have not the exclusive ownership of the patent, and are not entitled to maintain the bill of complaint. It appears that the patentees conveyed to Stanwood and Bailey all their interest in the invention as secured to them by the letters patent for, to, and in the State of Massachusetts, except the right to build said machines. Any assignment which does not convey to the assignee the entire and unqualified monopoly which the patentee holds in the territory specified, or an undivided interest in the entire monopoly, is a mere license. The monopoly granted to the patentees is for an entire thing. It is the exclusive right of making, using, and vending to others to be used, the improvement described in the patent, and for which the patent is granted. The instrument introduced in evidence by the respondents purports to convey to Stanwood and Bailey the exclusive right in certain specified territory to use, and vend to others to be used, the patented invention, but it does not convey, but expressly reserves to the grantors, the right to make the machines.

As well stated by Chief Justice Taney in *Gaylor et. al. vs. Wilder*, 10 Howard, 494, it was obviously not the intention of the legislature to permit several monopolies to be made out of one and divided among different persons in the same limits. Unquestionably a contract for a purchase of a portion of the patent right may be good as between the parties as a license, and enforced as such in the courts of justice, but the legal right in the monopoly remains in the patentee, and he alone can maintain an action against a third party who commits an infringement upon it. The bill of complaint in this case charges that defendants have made and do make the patented invention in violation of complainants' rights under the patent. The bill can unquestionably be maintained for that infringement of the exclusive privileges of the complainants, even if it were necessary to join other parties as complainants in a bill alleging infringement only by vending and using.

The next inquiry is whether Sanford & Wheeler were the original and first inventors of the improvement described in the specification and letters patent. As to this, Judge Shepley decides that they are and sustains the patent.

J. B. Robb and *C. O. Morse*, for complainants.

C. Smith and *W. W. Swan*, for defendants.

United States Circuit Court, District of New Jersey.

SAMUEL WETHERILL *et al. vs.* THE PASSAIC ZINC CO. *et al.*

[*In Equity.—Before Mr. Justice McKennan.*]

CONSTRUCTION OF LICENSES AND GRANTS—RIGHTS OF GRANTEES UNDER A PATENT AFTER IT IS EXTENDED.

Held as follows:

A conveyance of buildings, machinery, etc., "with rights to use" certain patented processes, for working which they might be adapted, is a license to use the processes in those buildings only and not a general license.

Words restricting a grant of certain patented processes to such as the grantor "holds in his own right" are to be understood as meaning such as he holds for the benefit of others, and not those of which he owns only a part interest, and they pass under the grant.

A grant of all the patents which the grantor "now has, or has in contemplation to obtain," does not embrace the extended terms of those patents.

A license to use an invention "for the whole term of the patent which may be granted," given before the issuing of the patent, does not authorize the use of it under an extension of the patent.

The right to use a patented process during the original term of the patent does not, under the 18th section of the act of 1836 (re-enacted in 1870,) authorize the use of it after the patent is extended.

The grant of the right to use a patented process, and of apparatus which, though capable of being adapted to the process, was constructed to accomplish the same object by different means, does not, after the patent is extended, authorize the use of the process in the apparatus.

Geo. Harding, for complainants.

E. W. Stoughton and *Geo. Gifford*, for defendants.

THE great joiner—the lawyer; he can replace a tenant, impanel a jury, box a witness, bore the court, chisel his client, augur the gains, floor a witness, nail a case, hammer the desk, file his bill, and gouge the whole community.

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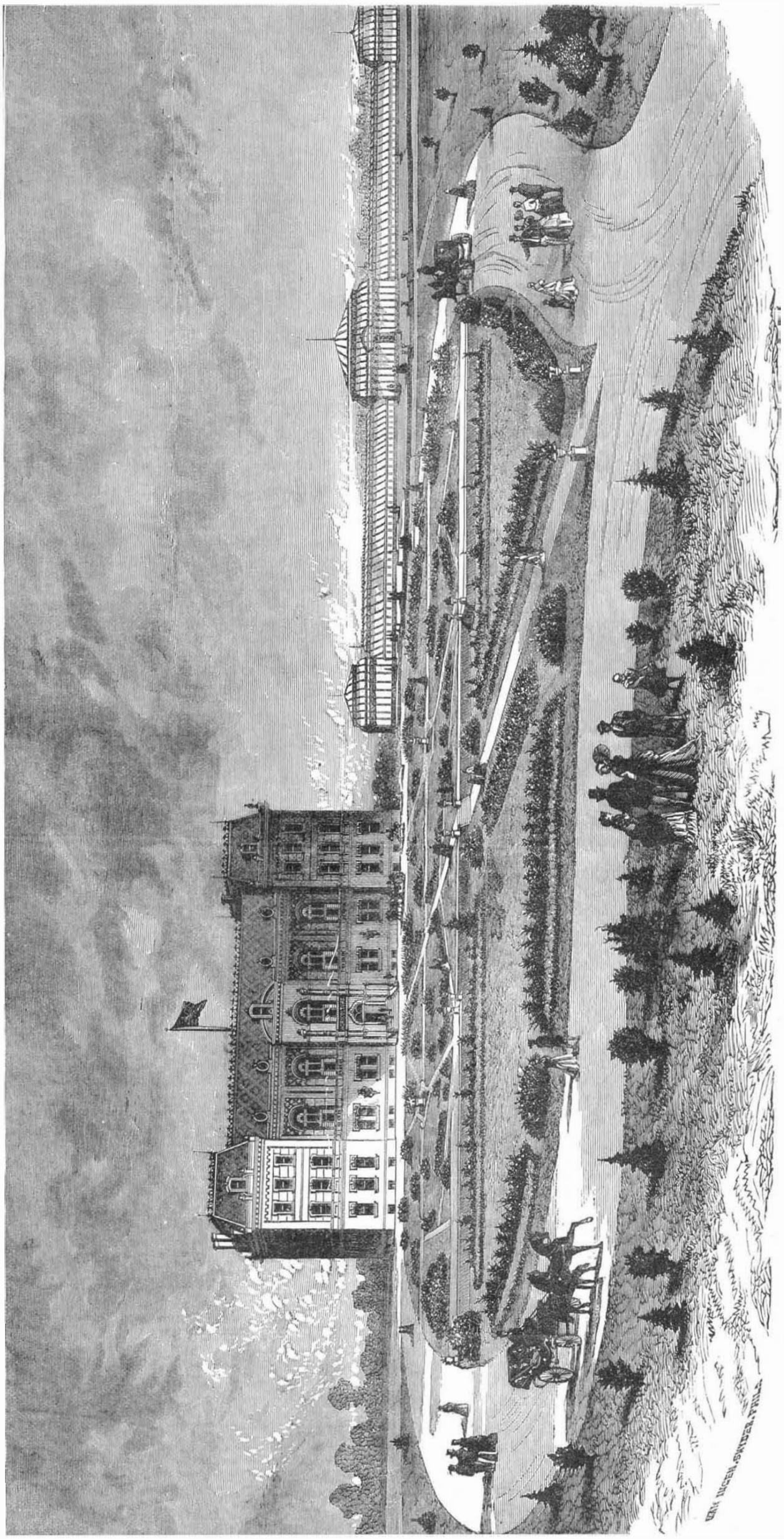

THE AGRICULTURAL DEPARTMENT, WASHINGTON, D. C.

THE AGRICULTURAL DEPARTMENT AT WASHINGTON.

It is a matter of surprise and regret that it is but recently that the claims of agriculture have received national recognition, and that the Government should not have appreciated at an earlier date the necessity of applying a portion of the national wealth to such development of the resources of the country. Some thirty years ago, the first appropriation, the merely nominal sum of $1,000, was, at the instance of the Commissioner of Patents, Hon. H. L. Ellsworth, devoted by Congress for this purpose. For two years previously the above mentioned patriotic gentleman had been distributing seeds and plants gratuitously, and for nine years, during his entire term of office, did he continue his good work. His successors in the Patent Office kept up the practice, but it was not until 1862 that the Department of Agriculture was formally organized.

The appearance of the building and its adjacent gardens is well depicted in our engraving. The grounds and conservatories are filled with specimens of almost every plant and tree indigenous to our country—from the luxuriant tropical vegetation of the Southern States, to the dwarfed and hardy foliage of our northern borders. A division is devoted to horticulture and the propagation and acclimatization of new and foreign species. Studies in ornamentation, in the best means of hybridizing, budding, pruning and grafting in treating diseases of plants and trees, are thoroughly pursued in the experimental gardens. Seeds of new varieties and of superior quality, as soon as they are obtained, are freely distributed throughout the country on application to the Commissioner of Agriculture.

The Department maintains at least one correspondent in every county of the United States, through whom statistics of quality and quantity of crops and other facts are forwarded to Washington, to be there distributed by means of the monthly and yearly reports. Specialists are also employed to prepare for these reports instructive articles on suitable topics. Questions from agriculturists are freely answered and the fullest possible information afforded. The purchaser of a farm situated in a region with which he is unacquainted has only to inquire, and the department will tell him the crops likely to prove remunerative in the special locality, advise him regarding cultivation, and warn him of obstacles to be surmounted and the best means of overcoming them. A chemist will analyze the soil, report as to its properties and the value of fertilizers to be used thereon; a botanist will give every particular regarding the natures and diseases of plants, and will point out in what families to seek needed products and what effect a change of soil will have upon them. An entomologist will give advice regarding the insects which destroy vegetation, and as to the best mode for their extermination.

As compared with the other national bureaux, the expense of this department is remarkably small. The cost of the library and museum was $140,000, and the conservatories were built at an expense of but $52,000 more. The library contains a valuable collection of agricultural literature in several languages. Volumes of rare pictures are arranged on long tables—one work a present from Francis Joseph I, Emperor of Austria, entitled "Nature Printing," containing representations of ferns so exquisitely printed that it is difficult to believe them unreal. In the museum are specimens of fibrous products, cereals of this and other countries, stuffed birds and plaster casts of fruits from all the different sections of the United States, arranged so as to show at a glance the products of each region and the specific changes caused by transportation. On the walls of the fruit cabinet are hung diagrams, showing the character and habits of the different insects that prey upon fruit and fruit trees, and in glass cases are preserved the native birds that feed upon destructive insects and should be protected by the kind treatment of the agriculturist. The whole arrangements are neat and handsome, and well repay a visit to this department of science and agricultural art, which is filled with rare specimens of artistic excellence and skill.

AMMONIA IN SNOW WATER.—Dr. Vogel refers to Dr. von Liebig's researches, made in 1826 and 1827, on the quantity of ammonia as nitrate in rain water, and then records at length his own researches on the presence and quantity of ammonia contained in snow and snow water. By the method employed by him the following results were obtained, 1 liter of snow water being the unit:—Freshly fallen snow, collected in a porcelain basin, at 0° gave 0·003 gramme; at —3° gave 0·002; at from —9° to —15° gave 0. Snow water, from snow which had lain for twenty-four hours, on a piece of garden ground manured during the previous autumn, contained 0·012 gramme. Snow water from snow which had been twenty-four hours on a meadow contained 0·009. Snow which had been twenty-four hours on a zinc roof contained 0·004.

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[From Journal of the Franklin Institute.]

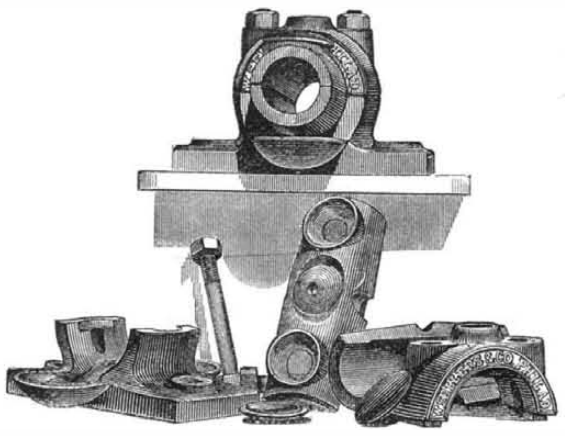
TRANSMISSION OF MOTION.

A Lecture delivered by Coleman Sellers, at the Stevens Institute of Technology, Hoboken, N. J., February 19th, 1872.

NUMBER III.

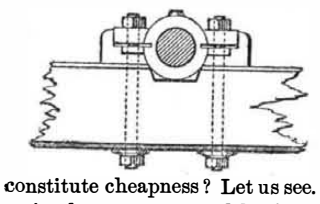
What I have said in description of the modern hanger holds good in the various forms of bearing, suited to various uses where hangers are not admissible. Thus, when the shaft is to be carried by stone piers, not likely to lose their horizontal adjustment, or in cases of vertical shafts, pillow blocks are used in place of hangers. I have an example here

FIG. 10.



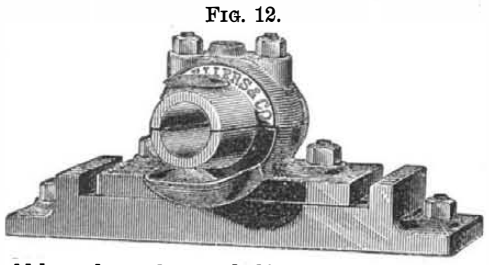
(Fig. 10). The box is furnished with spherical surfaces to fit in sockets in the casting or frame; it is self-adjusting as to line, but cannot be raised or lowered as in the case of the hanger. It takes the place of what is known as the clamp box, and of any rigid bearing not adjustable. It was a clamp box that I found among the many ingenious illustrations of mechanical devices in the cabinet in the room of your Professor of Mechanical Engineering. I have it here (Fig. 11).

FIG. 11.



It is very simple in construction. It is made of two pieces only; don't look as if it would be expensive to make, and just the thing for the "anything-is-good-enough–so-that-it-is–cheap-people." But does first cost constitute cheapness? Let us see. Once upon a time I thought a circular saw, operated by foot power, would be a very good thing to have in the house. I had a suitable band fly wheel and treadle; all I wanted was a saw mandrel and circular saw. These were furnished by a saw maker of renown, at a very moderate cost, say seven dollars and fifty cents. For bearings it had clamp boxes, lined with Babbitt's metal. A neat wooden framework was soon made to receive the boxes, and the work of fitting them to place begun. This did not take very long, it is true; but when I came to screw up the holding down bolts, the spindle would not revolve, so a little more cutting and carving was needful; and at last, after much patient labor, it seemed all right, and the saw was turned very satisfactorily. In a few days, however, it was fast again, and I found the frame had sprung from warping, and had to be refitted. All this careful work would not have been requisite had the saw been driven from a steam engine; but foot power is of limited capacity, and any serious loss from friction is soon felt. Now had this spindle been provided with ball and socket bearings, all the work needed would have been to bolt them to an approximately true surface, and they would have made their own alignment, and would never have bound or cramped the spindle. Why, those clamp box-

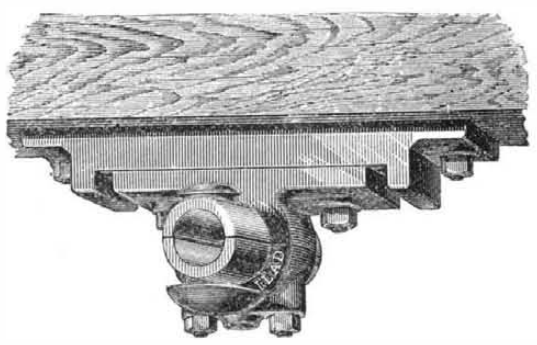
FIG. 12.



es would have been dear at half the money, when the cost of fitting, etc., is taken into consideration. I have seen a saw mandrel, with an 18″ saw, running in cast iron ball and socket bearings, working well after 16 years' hard usage, and during that time never having been adjusted, and that spindle is to-day as good as when it was made.

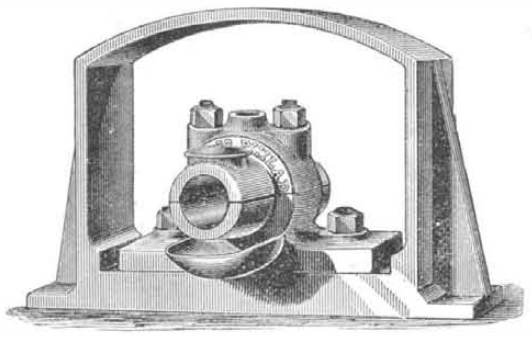
Pillow blocks are sometimes used in connection with cast iron wall plates upon which they rest, and are secured by bolts. I have an example of such a construction (Fig. 12).

FIG. 13.



This same combination inverted, with an oil dish on the cap of the pillow block, is now used extensively to carry the head shaft of long lines, as it admits of the very heavy head shaft, with large pulleys, being hoisted into place, and then secured by the cap and bolts. A head shaft, or the first shaft of any line, usually rests in two bearings. Fig. 13 shows such an inverted pillow block. Sometimes it is requisite to build bearings in a wall, in which case what is called an arched wall box (Fig. 14) is used in connection with the pil-

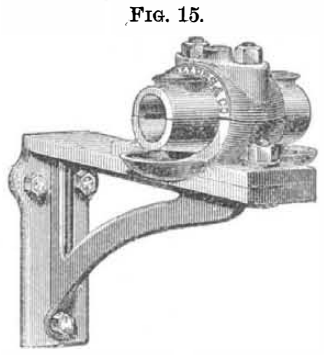
FIG. 14.



low block. Very often it is advisable to support the line shaft from the face of a wall, in which case pillow blocks, secured to knees, are very convenient (Fig. 15).

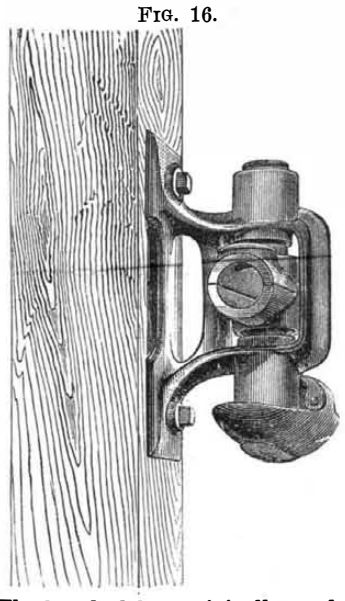
Mr. Bancroft thought all boxes should be made five diameters of the shaft long, namely, a box for a 2 inch shaft should be ten inches long; but it has since been demonstrated that four diameters is sufficient, and that has been the practice for many years. I have here also an example of a hanger to be fitted to a post; it is called in that form a post hanger (Fig. 16). It is in all essential particulars like the ordinary hanger, so far as its adjustment and swiveling principles are concerned.

FIG. 15.



Before leaving the subject of bearings, I would mention that there are examples of cast iron boxes, in use in woolen factories where high speed shafts are running, which show no appreciable wear after 22 years' use. In 1867, I read a paper on journal bearings before the Franklin Institute, in Philadelphia, and while preparing that paper I took occasion to examine a bearing in which had been running, for 16 years, a 4½ inch shaft, with a pulley 72 inches diameter and 20″ inch face, close to the bearing, taking all the power from an engine of 16 inch cylinder, 3 feet stroke, making 50 strokes per minute—say transmitting forty-two horse power. This bearing showed a bright surface over the extent of one third of the circumference of the shaft on the bottom half box.

FIG. 16.



The box had been originally made to fit the journal loosely, and it had not worn enough to make it fit over one third of the circumference of the shaft. In the use of cast iron bearings, lubrication must be attended to, else the bearing will soon be cut and rendered useless; but lubrication is so easy, and so little oil is needed for the purpose, that there can be no reasonable excuse for neglect. You will observe in the sample of the hanger now before you, two large cavities in each end of the top box; these cavities are called tallow cups. They should be filled with tallow and oil, mixed so as to be of such a consistency as not to be fluid in warm weather. Should the journal heat from any cause, this same solid lubricant will melt, and, running into the bearing, will protect it for the time being. The box should be oiled in the center, and oil holes are provided for that purpose in the recess around the spherical portion of the top box. There is also a hole in the very center of the ball on top, and the top plungers, which rest on the ball, being hollow, a self-feeding oil cup can be placed on top, and thus deliver oil regularly to the bearing. As to the quantity of the oil needed, I would remark that shafts running in self-adjusting hangers, with bearings four diameters long, at a speed of 120 revolutions per minute, require, on an average, $2\frac{2}{10}$ fluid ounces of oil per bearing for six months' oiling, and self feeding oilers, placed on top, should not deliver any more than this quantity.

From time to time a great deal is said about self-oiling boxes; by this term is meant boxes that are made to contain oil in some reservoir usually under the shaft and from which reservoir oil is fed to the shaft, and then allowed to run back into the reservoir and thus be used over and over again. It is said that bearings in self-oiling boxes have been made to run for a year or more without attention, but I have never known a self-oiling box to be made to work well with so little oil as $4\frac{4}{10}$ fluid ounces in it. Some of them hold a pint each, and only the other day I was called upon by a manufacturer who required some shafts, couplings, and pulley, but who did not want hangers, as he would make his own self-oiling hangers. I asked him how much oil he put into each box. "Oh, about one pint," he said; "I do not think them safe with less." One pint is 16 fluid ounces, quite enough oil to last four years, if properly applied, and yet it would never do to trust that quantity of oil for that time, as it would become deteriorated by age. Self-oiling boxes are rather more costly, and take more oil to run them, than properly made bearings oiled by hand. Self-oiling boxes are good things to sell—better than to use; they are good things to talk about to those who do not know what true economy in oiling is. Glass oil cups above the bearing, feeding oil at such a rate as to consume 2¼ fluid ounces in six months to, say, hangers for 2½ shafts, are the best, and oil fed at this rate will not run out of the box ends, but will just supply the waste from consumption.

All shafts, long or short, must be provided with some means of preventing end motion. Line shafts should have one pair of collars fitted to one of the bearings only. The collars placed usually on the first or head shaft should control the position of the entire line; more collars are apt to cause needless friction. When shafts are collared, the collars should be fast to the shaft; loose collars held in place by set screws are sometimes used, but are more expensive and cumbersome than the fixed or fast collars. Some engineers prefer necking in the head shaft to some smaller size in the journals. Suppose the first or head shaft require to be made of iron 6½″ diameter, to sustain the driving belt. This shaft might be necked in, and be carried by bearings, say 5½″ diameter, and the ends still further reduced to the size of the shaft to be coupled to it. This practice of necking in the bearings of the head shaft, common in modern cotton mill practice, has the advantage of diminishing the velocity of the surface motion and of the shaft in the box; for by diminishing the diameter we diminish the speed of the rubbing parts, and the tendency to heat is much increased with increase of velocity.

To determine the size of shafts for the transmission of a given power, a safe formula is D= the cube root of [(P÷R) ×125] D being diameter of shaft, P the horse power, and R the number of revolutions per minute. This gives a shaft strong enough to resist flexure, if the bearings are not too far apart. The distance apart that the bearings should be placed is an important consideration. Modern millwrights differ slightly in opinion in this respect; some construct their mills with beams 9′ 6″ apart, and put one hanger under each of the beams; others say 8 feet apart gives a better result. I am clearly of opinion that with 8 feet distance, and shafting lighter in proportion, the best result is obtained. The tendency now is to increase rather than diminish the speed of line shafts, and good practice is to run shafts for machine shop purposes at 120 revolutions, for wood-working machinery at 250 revolutions, and for cotton and woolen mills at from 300 to 400 revolutions per minute. Hollow or pipe shafting has been made to run at 600 revolutions per minute, very satisfactorily. This kind of shafting is too costly to be generally introduced.

Mr. James B. Francis, of Lowell, writes me that since the decrease of the water power in that town, or rather the rapid increase of the factories, they have been obliged to economize their power, and they are doing so by using smaller shafts at higher velocities, and have even made extended lines only 1¼ inch in diameter. They so arrange the mill as to secure a hanger close to each transmitting pulley. The torsion in long lines limits the smallness of the shaft used, and in all probability the best result will be found to be obtained in the use of not less than 1¾″ diameter for the smallest line shafts in cotton mills.

There are now running in some factories lines of shafting 1,000 feet long each. The power is generally applied to the shaft in the center of the mill, and the line extended each way from this. The head shaft being, say 5″ diameter, the shafts extending each way are made smaller, and small in proportion to the rate of distribution, so that from 5″ they often taper down to 1¾. In coupling shafts of different sizes, it is customary to reduce the end of the larger one to the size of the smaller shaft, and then to use a coupling suited to the smaller size. Fig. 17 shows an example of this method of reducing the larger shaft to the size of the smaller one. The rapidity with which the reduction of the size of the sections is made must depend, in all cases, on the distribution of the power. For instance, if a line of any length whatever receives its power at one end, and transmits the same amount of power at its other end, such shaft must be of uniform diameter; but if it distributes its power at regular intervals along its length, the shaft may be made in sections of a size proportioned to the power given off.

FIG. 17.

It would be impossible in one lecture to detail all the contingencies that influence this reduction, as questions of expediency will often have a decided influence. While speaking of the relative velocity of shafts, I would like to call your attention to one consideration touching on the economy of fast running shafts. To run a shaft of a given size and weight, say 200 revolutions per minute, must take more power than to cause the same shaft to revolve 100 revolutions, but with increased velocity the diameter of the shaft may be diminished, and with it the diameter of the driving pulleys may also be lessened; and hence the weight on the bearings will be reduced and the velocity of the surface of journals not much increased. With the formula I have already given you for computing the proper size of the shaft for the transmission of a given power, at a given velocity, you can readily work out comparative examples, and thus demonstrate the advantage of high speeds over low ones.

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Vienna Exposition.

To the Editor of the Scientific American:

The epidemic of personal abuse which has pervaded the country for the past few months seems, at last, to have reached the office of your journal.

From an article under the above heading, in your issue of November 16, I extract the following: "Then there is General Van Buren, the United States Commissioner for this show, who will also come in for emolument. At present his office is purely honorary; he draws no pay and knew this when he accepted its functions. But of late, he has been very arduously engaged in his exhibition duties, stumping eloquently around the country to urge the election of General Grant, and the administration will of course be expected to provide for his trip to Europe." But once before has any personal assault been made upon me in connection with my official duties, and that was in a communication to one of our daily papers, from a person to whom I had refused the appointment of assistant commissioner. I am not aware of having similarly disappointed any gentleman connected with the SCIENTIFIC AMERICAN, and am therefore at some loss to know to what to attribute the paragraph I have quoted.

While glancing at your article, my eye was caught by certain prominent figures at the head of your editorial columns, which advise the public that your journal is furnished to subscribers at three dollars per year. And, upon turning the page, I find, as the frontispiece, a very excellent representation of a weaving loom attended by an attractive young woman. I might perhaps; be considered personal if I should suggest that your paper was a "show paper," notwithstanding its high sounding title, and that you published it for "pay" and not in the interests of science. And if further I should say that, in your opposition to the International Exhibition at Vienna, you had been moved by a desire to commend your paper to American inventors as the especial champion of their interests, with a view to increasing your circulation and drawing to your net applicants for patents, and thus add to your incoming wealth, I should doubtless find many who would credit the assertion, whatever might be said of my taste in making it. If, in addition, I should announce that you had labored zealously to secure the election of Mr. Greeley to the Presidency, your judgment would probably, in many quarters, be criticized, but your right as a citizen to do even this would not be questioned.

Now, with these comments, let me at once admit the truth of your statement that my office is without pay, and that I knew this fact when I "accepted its functions;" but permit me to add that I did not seek the position, and I only assumed its duties when made to believe that I could thus render some service to the country. And, further, let me say that I have no intention of going to Vienna and giving a year more of my time and exertion at my own expense, and, in addition, pay out of my own pocket the expenses of the Government. If you have any disinterested individual connected with your editorial department who is anxious to do all this, send him along, and he can take the position at once. Neither can I well see why I should thus devote myself to public interests by taking charge of, what you are pleased to term, "a show" at Vienna, where American inventions are exhibited and their superiority established before the whole world, while you demand hard cash for publishing what *I* may please to call a *show paper* to a limited number of subscribers. Your assertion also that I have been "stumping eloquently" for the election of General Grant I will not deny, but when you say that I have in that way "been arduously engaged in my exhibition duties," thus insinuating that I have neglected my official duties and taken to the stump with a view of having a claim for compensation as commissioner, you invent a foul calumny which I respectively insist even newspaper editors have no patent right to do.

Ever since the formation of the Republican party, I have taken an active part in its contests, and, while I believe in its principles, I shall continue to do so. While doing this I have never neglected more important duties, nor have I ever been the hired advocate of any committee or clique, for I have uniformly refused compensation and paid my own expenses. As commissioner to the International Exhibition at Vienna, I have labored zealously for the past four months to make the American Department a success. I have done this to the entire exclusion of my own personal business, and without reference to my own interests, or as to whether I should continue in the commission and go to Vienna or not. While thus engaged, I have earnestly striven to secure a convention and treaty in the interests of our inventors. The Governments of Austria and the United States have ratified a treaty upon trade marks which goes far to secure the rights of our citizens, but I have desired farther to procure an abrogation of certain obnoxious requirements of the Austrian patent laws, and I have caused to be prepared and sent to Washington a draft of a treaty to that end; such a treaty the SCIENTIFIC AMERICAN has professed to be strongly in favor of. If its assistance is to be of the character of the articles thus far published in its columns upon the subject, I may be pardoned for saying it will not prove valuable.

I take pride, in this connection, in stating that all my applicants for space thus far have expressed their determination to send their goods to the exhibition if they have to do it at their own expense; and that in no instance have they asked that their board bills be paid by Uncle Sam.

It may be witty to call the International Exhibition "a show," and to insist that exhibitors are only so many advertisers who ought to pay for their advertisements. "This world is all a fleeting show;" and yet there are many people who are foolish enough to be exceedingly interested in its affairs; and I fully believe that our country will see something more in the grand collection of the industries of all nations at the Austrian capital than a great advertising agency.

I regret that one of our leading scientific journals should take so narrow a view of it, and would fain believe that the editorial in question was the offspring of a bad dyspepsia, or an election bet lost on the late "tidal wave."

I will not do you the injustice to express a doubt of your giving this communication a place in your columns.

THOMAS B. VAN BUREN.

United States Commissioner for the Vienna Exposition of 1873.

The Bursting Strain on Cylindrical Boilers.

To the Editor of the Scientific American:

The SCIENTIFIC AMERICAN holds the position of the leading scientific and mechanical paper of the most influential nation on the face of the globe. By constantly reading it, more practical and useful knowledge can be obtained with less effort than from all other periodicals and books combined. As such, I have time and again recommended it to young men generally, and to mechanics particularly. As one holding these views, I wish to offer a suggestion.

Every paragraph appearing in your paper, although it be a correspondence for which the paper is "not responsible," bears a *quasi* endorsement as having been found worthy to enter your columns, being selected from among a number, the majority of which are rejected.

In your issue of October 19, 1872, page 244, is an article on "Cylindrical Boilers," which I supposed to have been inserted for the purpose of being refuted. The error it contains is made plausible, and stands endorsed therein by Fairbairn, "so extensively known in scientific engineering." A mere expression of difference of opinion was likely to go unheeded as against such endorsement. Therefore, in my communication to you on the subject, I used ridicule to show more strikingly the absurdity of the position taken. This went into the "basket," and the error asserted by Bakewell still stands in your columns unrefuted, teaching to my young friends, whom I have advised to examine the SCIENTIFIC AMERICAN for knowledge, that which is totally erroneous.

Imagine my surprise when to-day, in your answers to correspondents, I perceived that my communication, intended to ridicule Bakewell's proposition by showing its absurdity, could have been understood as expressing my own belief, you putting down your "constant reader" for so many years as a believer in perpetual motion—"the unkindest cut of all."

The pressure in any vessel cannot be greater in one direction than in the opposite direction. Hence, I chose, as strikingly illustrating the error, the semi-circular shape on one side, and a diameter or flat side on the other. On the latter, Mr. Bakewell will hardly contend, unless he irretrievably belongs to the perpetual motion school, that the pressure is greater than at the diameter. How, therefore, can he claim that on the semi-circular portion it can be any greater? His mode of reasoning by "resolution of the radial forces into horizontal and vertical," and again, "of vertical forces so obtained into horizontal," etc., at once points out the error in his mode of reasoning.

Believing that with your great experience and knowledge you always admit an oversight, and set your columns right, I continue your appreciating and constant reader,

ROBERT CREUZBAUR.

[We printed Mr. Creuzbaur's answer on page 298, and called his attention to Mr. Bakewell's letter, which did not state that there was a greater pressure on the convex part of a boiler than on the flat. His assertion was that the bursting strains of boilers vary as the semi-circumferences, and not as the diameters. We shall publish next week a letter, which is to the point in Mr. Bakewell's theory.—EDS.]

Transmission of Motion.

To the Editor of the Scientific American:

I have read the criticisms by Mr. James Garland on a lecture delivered by Mr. Coleman Sellers on the above subject, and I am surprised to find even a comparative advocate of the plate coupling.

When, two years ago, I first became acquainted with American mechanical engineering, there appeared to me nothing in this country more strikingly superior to English mechanical engineering than the American or specially Sellers' way, here generally adopted, of constructing shafting, coupling, hangers and all appliances connected with the transmission of motion.

Mr. Garland is perfectly correct in saying that, in England and elsewhere, the way to keep shafts in the plate coupling in line is to let one shaft enter the opposite part of the coupling a short distance, but I have also known engineers in England who advocate and practice the mode described by Mr. Sellers, of true-fitting bolts in preference to fitting the end of a shaft in the coupling of a shaft of different diameter.

There is no doubt that a worse contrivance than a true-fitting plate coupling, or the one Mr. Garland saw fifteen years ago, may be invented; but the advantages of the double cone coupling, as compared with the former, appear to me to allow of no dispute. If Mr. Garland is correct that it is not considered good practice in England to enlarge the shafts for the reception of couplings, then there is certainly a great amount of bad practice in England. I have seen not only the ends of the shafts for the reception of the couplings, but also the seats for the pulleys, enlarged, and this I would call good practice, if it were not for its costliness. I have had for years the best opportunity to become acquainted with English and Scotch engineering, through personal visits to the engineering establishments in those countries; but to give Mr. Garland other authority, I refer him to any of the English publications on engineering practice.

Philadelphia, Pa. L. SCHUTTE.

Shifting Belts on Pulleys.

To the Editor of the Scientific American:

S. W., in the article on the transmission of motion, page 292 of the present volume, suggests an idea that may be a valuable one. The same idea occurred to me long ago, but without trying it, I had not thought it practicable to shift a belt from a pulley not in motion. Will J. W. please inform us if he has seen an actual trial of it?

A plan that I have tried somewhat, and which works well, is to make the loose pulley smaller than the tight one, so as to relieve the strain of the belt and the pressure on the bearing when the belt is on the loose pulley. Where the tight pulley is of wood, so that the edge can be beveled, a difference of an inch in the diameters is no hindrance to the shifting of the belt.

Good authorities say that the adhesion of a belt is as the square of the amount of circumference enveloped by it. Then it seems to me that it is a good policy to cross belts where it is possible, for the gain in adhesion must, in most cases, be more than the extra wear by crossing.

Buchanan, Mich. W. G. BLISH.

An Invention wanted for Dressing Ramie.

To the Editor of the Scientific American:

A machine is now wanted by the agricultural industry which will largely pay the trouble of inventing it. That fine plant called ramie or China grass (*Urtica tenacissima*), is being cultivated in Louisiana, Texas, California, Mexico and Cuba, but the planters find that the way to a large production is obstructed by the want of an efficient and substantial machine for extracting the valuable fiber, and what is most desirable, for extracting it in large quantities.

I wonder that this machine has not been invented in the true land of useful inventions, although Mr. Lefranc, of Louisiana, has tried and succeeded to a certain extent, in extracting the fiber, but only at the rate of 250 to 300 pounds a day. I am sure that the man who should make such a gift to the pioneers of the ramie culture in those States would be amply remunerated by the selling of hundreds, if not of thousands, of such machines.

Havana. A PLANTER OF RAMIE.

The Stow Pavement.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of October 19, in an article on wood pavements, you state that the Stow pavement on Sixth or Seventh avenue is wearing out. I will inform you that there never has been a single foot of the Stow foundation pavement laid down on either of those avenues in the city of New York. Will you please correct your statement in the next issue of your valuable paper?

Buffalo, N. Y. HENRY M. STOW.

[The pavement alluded to should, we believe, have been mentioned as Stafford's.—EDS.]

The August Shower of Meteors as seen in Texas.

To the Editor of the Scientific American:

In regard to the shower of meteors of August 10, I would state to you that on the morning of the 11th, between 12 and 1 o'clock A. M., I beheld the finest display of meteors that I ever saw in my life. They were in the west, at about an angle of 45° from where I stood, and were of many sizes, from the smallest speck up to the largest sized star, and very thick.

Bryan, Texas. P.

[For the SCIENTIFIC AMERICAN.]

ABSURD COSMICAL THEORIES.

BY W. T. ROBINSON, A. M.

Dr. Carpenter is not in advance of the SCIENTIFIC AMERICAN in ascribing great importance to common sense as a test for scientific theories. This rule, when applied to certain cosmical hypotheses, shows them to be too thin for any practical purposes.

For instance, Dr. Hickok, in his late work on "Creation," claims that matter results from three forces: antagonistic, diremptive and revolving." Antagonistic forces collide, neutralize and form lumps of matter. But what is this force that he freezes into matter? Heat, light, electricity and sound are examples of it. What is sound? It is nothing more than a jarring or vibration of the air or other substance. The "force" or vibration jars the auditory nerve, and produces the sensation of hearing. In like manner, the waves of light impinge on the optic nerve and produce vision. Heat acts in a similar way. But heat is not an entity in itself; it is merely an abstract name for molecular motion. A ball lying still represents no force; start it down hill and it has force proportioned to its velocity; when it strikes at the bottom, its mass motion is converted into molecular motion, or heat; hence, heat and motion are convertible terms. But this motion is not anything in itself; it is simply an abstract name for the process of a substance changing position; and, as all the forces of Nature are merely varieties of motion, it follows that without matter there can be no force, because motion is nothing more than the action of matter. Force is therefore really nothing in itself. Now, common sense rebels at the idea of the learned Doctor bringing two nothings into collision and begetting something, for every effect must have an adequate cause, every bairn a dad!

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La Place's nebular theory, as now understood by various cisentists, supposes that matter in the beginning was diffused throughout space, and that, through the action of the laws of matter, all the celestial machinery was developed by a process of evolution. But these evolutionists do not admit that matter was created; if not, then it had no beginning, hence no starting point. Go back as far as mathematics or imagination can reach, and there is still an eternity beyond. The theory is, therefore, not accordant with common sense, because it assumes a condition which could not possibly have existed.

Because our little world, and probably all other matter in the Universe, is revolutionizing, it does not follow that this change is evolution. Plants, animals, races revolve and die; meteors and comets are thrown into chaos, probably suns and systems are "knocked into everlasting smash;" but as the Universe can have no limits, there is no possible chance for a grain of matter or a vibration of force to drift off into the regions of nowhere. So that new suns and systems may arise from the fragments of the old ones, just as new plants grow up from the humus of defunct vegetation. Thus we have all things succeeding in endless rounds, vast, eternal, incomprehensible.

Council Bluffs, Iowa.

FIRE.

Professor C. F. Chandler, of Columbia College, recently delivered an interesting lecture at the Stevens Institute of Technology upon the very timely subject of "Fire." Beginning with general definitions, the lecturer explained the phenomena of combustion,and illustrated the reciprocal nature of combustibles and supporters of combustion by burning oxygen in ammoniacal gas, at the same time causing the latter to ignite in the air. Oxygen was also shown to burn in hydrogen and in an atmosphere of ordinary street gas. After explaining oxidation and the gradual combustion of bodies by decay, Dr. Chandler called attention to the manner of

AVOIDING FIRE,

and executed several experiments with carbonic and sulphurous acid gases. He then explained the principle of fire extinguishers, showing how they contained carbonate of soda in solution, to which, by turning a handle of the apparatus, sulphuric acid is added, thus generating carbonic acid gas, besides forcing out the stream of water. The construction of a well known invention of this kind was detailed, and its mode of operation shown. The lecturer then gave an excellent plan for

RENDERING LIGHT FABRICS FIREPROOF,

and astonished the audience by calmly setting fire to one of a pair of thin window curtains. He then applied a blaze to the other, which refused to be kindled. A similar experiment was made with two children's dresses of thin material: the first burst into flame the instant the lamp was applied, the second, though made of precisely the same fabric, could not be ignited. This effect was caused by mixing with the starch with which the articles were prepared the tungstate of soda, a crystalline and not very costly salt. Dr. Chandler suggested that a fireproof starch, properly prepared with this or some other suitable chemical, would be a very valuable invention.

The greater part of the discourse was devoted to the means of preventing fire.

STATISTICS OF FIRES,

recently compiled, show that 76,000,000 dollars was lost through isolated conflagrations in the United States, Chicago and Boston not being considered, within a space of two years. Investigations into the causes show that although the largest number of fires was due to incendiarism, no less than 12 per cent owed their origin to accidents with kerosene. Examinations, made by the Fire Marshal of New York city, also proved that 18 per cent of the fires occurring within the limits of one year were due to a similar cause. The lecturer then proceeded to explain the manufacture of kerosene, its nature and how it is adulterated. He stated that nearly all the

KEROSENE

sold in the city is unsafe, and instanced how he purchased 700 samples, out of which only 28 were not dangerous, and 37 were extremely bad. A very lucid description was given of the method of testing the oil, and the varieties of apparatus used were exhibited. The flash point and not the burning point should be considered, as, of course, the vapor of the oil must ignite before the liquid can kindle. One hundred degrees Fahr. was stated to be the commercial standard for the flash point, but Dr. Chandler considered that this should be raised to at least 130°, so as to preclude all possibility of the oil arriving at the flashing temperature while in the lamp. A strong denunciation was delivered against the manufacturers who sell unsafe kerosene and thus imperil human life. It is a common trick to delude customers by setting a little of the oil on fire in their presence to prove that it is non-explosive. If kerosene ignites at ordinary temperatures, it is a sure sign that it is extremely dangerous. The oil never in any case explodes, but its vapor when mixed with air does so. Kerosene which is almost pure gasolene is now sold in New York. One variety is known as "Safety Gas," so called to evade the law. It is sold by one Smith, at No. 40 East Broadway; (we give the individual the benefit of the gratuitous advertisement). To prove the inflammability of this compound, the lecturer poured a little on an old coat hung on a frame. On touching a light to the garment, it instantly burst into a fierce blaze, which continued a sufficient time to burn the wearer, if any there had been, to death. This oil was stated to be as dangerous as gunpowder, and should never be used. The properties of a really safe oil were then explained, and samples of various kinds shown. Among others were the products of several well known firms, the best being mineral sperm oil, which Dr. Chandler stated flashed only at 250° Fah., and was practically as safe as whale oil. Taking a specimen of this liquid, he heated it to a temperature of 212°, lit some cotton waste saturated with it, and actually extinguished the flames in the boiling oil. The same material, when poured on a garment, could not be ignited. Good oil is necessarily more expensive than the inferior qualities, but the very best only costs one half cent per hour, while the worst cannot be sold at a lower rate than one quarter of a cent, for the same period.

LAWS REGARDING THE USE OF OIL

should, said Dr. Chandler, be rigidly enforced; and he called attention to the late English enactment on the subject. The various state laws hitherto passed are virtually inoperative, their principal defect being that their execution is left to inspectors, who can be approached and so caused to neglect their duty. Selling or making dangerous kerosene should be legally made a crime, punishable by heavy fine for every offence. In case human life is sacrificed, the manufacturer should be indicted for manslaughter. Inspectors should be abolished and the evidence of every citizen taken as competent to prove the manufacture or sale of bad material.

CARBONIC ACID AS A PREVENTIVE.

Dr. Chandler alluded to a company which at one time was started in this city for the purpose of introducing carbonic acid gas through pipes into all the houses, so as to have a means of extinguishing fire ready at hand. This, he said, would be extremely dangerous, because in event of a leak in the pipes, the same could not be discovered, and the escaping gas would suffocate the inmates of the dwelling. It was proposed at one time to compress this gas into a liquid and furnish it in iron casks to vessels, so that, when there was danger of fire, the gas might be set free.

STREET GAS

was also discussed. A common cause of fires is the habit of running over a gas pipe with a light in order to detect a leak. This is highly dangerous and often causes explosions. How to use gas was also explained. People complain of their gas when the fault is in the burner. A very large amount of money is yearly wasted simply because gas is improperly consumed. Iron burners are bad because they become rusty; brass are better, and those of soapstone or lava, as they are known in the trade, are the best. The most effective burner is the "argand" and the best the lecturer had ever seen was known as "Sugg's London Burner," made in England. This is an argand burner constructed of soapstone.

FIREPROOF BUILDINGS

were next taken up. Mansard roofs were strongly condemned and also the practice of using inflammable materials in buildings. Pine wood is so cheap in this country that it is employed for house carpentry almost to the exclusion of other kinds, while it is the most dangerous in existence. Dr. Chandler then proceeded to explain the French mode of building, which he said was almost absolutely fireproof. Floors consist first of a number of thin iron beams, much thinner than are used in this country, placed some two feet apart. Across these are laid a number of rods of hoop iron, and across these again more of the same material, until a network with interstices of about a foot in size is formed. A flat platform is then brought up underneath, and liquid plaster is poured over. As soon as this sets, the platform is removed and the floor remains, a solid mass of plaster and iron. Walls are constructed after a similar fashion; a few light scantlings are put in position to give shape and, boards being temporarily placed on either side, liquid plaster is poured in and allowed to harden. All walls and floors therefore are perfectly solid, and consequently fireproof. Dr. Chandler then gave a very entertaining account of a fire in the Palais Royal, in Paris. He said that the inmates of other parts of the house did not manifest the slightest unconcern nor move a single article. Of the Paris Fire Department, he gave an amusing description, saying that it was but a single garden engine and a line of men passing buckets. This, though seeming ridiculous at first, really showed the sense of the people, who, instead of paying immense sums for an elaborate organization, spend their money in rendering their houses incombustible. A fire in one room in a French house spreads no further. It is only necessary to close the doors and let the articles contained in the apartment burn up. No other damage can be done.

In great cities every house should be, by law, fireproof Our so-called fireproof warehouses are manifestly easily consumed, a fact shown by the immense number of windows which are always constructed in them and which offer no resistance to the fierce blasts of hot air from an adjacent burning edifice. All windows should be provided with iron shutters, not swinging, as these are easily curled up by heat, but enclosed and sliding in the wall. Shutters should, however, be double, so as to leave an air space between them.

Dr. Chandler spoke at considerable length on fireproof construction, strongly advocating wide streets and isolation of buildings, and concluded his discourse, which was loudly applauded throughout by quite a large audience, by an appropriate quotation from Schiller's "Song of the Bell."

IT is said that a copper mine has been discovered in Jackson county, Ill., of extraordinary richness, at a depth of only ten feet. Experts, they say, pronounce the ore to contain ninety-five per cent pure metal, and in consequence all the inhabitants of the county have dropped their ordinary occupations and gone to sinking wells in hopes to strike a "lead."

Chemical News Translations from *Comptes Rendus, Journal de Pharmacie, Neues Jahrbuch* and *Revue Scientifique.*]

Formation of Corrosive Sublimate in Powders containing Calomel.

The author has instituted a series of experiments to ascertain the correctness of the assertion that calomel when mixed with other powders becomes converted into corrosive sublimate; the results of these researches may be summarized as follows: No corrosive sublimate is formed within twenty, four hours when calomel is mixed with saccharum album-saccharum lactis, magnesia usta, magnesia hydrico-carbonica, and natrium bicarbonicum. After three months no corrosive sublimate is formed in mixtures of calomel with magnesia usta, magnesia hydrico-carbonica, and any kind of refined sugar or milk sugar, but faint traces are formed in mixtures containing calomel, natrium bicarbonicum, and refined lump sugar. By treatment with water, corrosive sublimate is only formed in such mixtures of calomel as contain magnesia usta and bicarbonate of soda. Rather large quantities of sublimate are formed in powders composed of calomel, sugar, and bicarbonate of soda, if the mixture becomes damp and is kept for a long time. No sublimate is formed when a powder consisting of calomel and bicarbonate of soda is digested with water acidulated with hydrochloric acid. Pepsin does not favor the formation of corrosive sublimate.—*G. Vulpius.*

Pure Hydrochloric Acid.

The crude hydrochloric acid of commerce is first diluted, by the addition of water, to a specific gravity of from 1·14 to 1·13, and it is next treated with sulphurretted hydrogen gas until it smells strongly of the gas. The liquid is next filtered and then poured into a tabulated retort and heated until the sulphuretted hydrogen is eliminated. The test of solution of corrosive sublimate having been applied, the bulk of the acid is distilled over at a gentle heat, a few fluid ounces only being left in the retort, so that any chloride of iron left in the acid may be retained.—*Th. Diez.*

Starch in Potatoes.

A tabulated form contains the record of experiments with sixty-one different varieties of potatoes, in which the author had estimated the total percentage of dry substance and the total quantity of starch. It appears from this research that the percentages alluded to vary, for dry matter, from 15·64 to 34·25, and the percentage of starch from 8·79 to 26·09.—*Dr. Raab.*

Mejillones Guano.

This material occurs native and in large quantity near the Bay of Mejillones (Bolivia). In 100 parts, this substance consists of—lime, 30·6636; magnesia, 7·9193; peroxide of iron, 0·1466; alumina, 0·0047; potassa, 0·5051; soda, 1·4532; phosphoric acid, 35·86803; chlorine, 2·2250; sulphuric acid, 1·6036; silica, 0·0459; carbonic acid, 1·5956; water driven off at 100°, 7·6858; non-nitrogenous organic matter, 6·5189; nitrogen, 0·7675; granules of granite, insoluble in HCl, 2·2830; loss, 0·7249. The author states that this guano occurs in pulverulent sandy state, and that it is readily acted upon by carbonic acid and water, and thus rendered available for plants, while, in consequence of its high percentage of phosphoric acid, it may be used with advantage for the preparation of phosphate of ammonia and other phosphatic preparations.—*H. Vohl.*

Economical Preparation of Hydrogen.

By first reducing to the metallic state a peculiar kind of iron ore found at Chateauroux (France) by means of oxide of carbon, finely divided iron is obtained, which is used to prepare hydrogen, which thus costs only ½d. per cubic meter (35·31 English cubic feet) and may be used for various heating, illuminating, and air balloon filling purposes.—*M. Giffard.*

Applications of Sulphurous Acid Gas.

The author proposes to apply sulphurous acid gas—obtained in the usual way from pyrites or burning sulphur—for the purposes of saturating urine, the contents of *fosses d'aisance,* ammoniacal gas water, the waste soap water from woolen and other industries, partly for disinfection, but more particularly for obtaining valuable products by evaporation; the sulphurous acid gas is forced into the liquids by means of blowing fans or force pumps.—*M. Chaudet.*

Why the Fire Spread so Rapidly.

All the accounts agree in attributing the fearful spread of the conflagration in Boston, to the presence of the "Mansard" roofs, which proved to be simply huge wooden boxes, mounted upon the summit of granite walls, far above the reach of the firemen. Mr. H. S. Oakley, President of the National Board of Fire Underwriters, New York, cautioned the Boston Board of Underwriters in relation to this very matter more than four years ago, and asked them to use their influence toward suppressing the erection of these immense frame structures above the cornices of their business houses and dwellings. The building in which the fire originated he was well acquainted with, as he had given it his personal examination, and he feared that it and similar structures would at some time or other entail a great loss on the community. It was 60 by 100 feet, and the Mansard was from 20 to 30 feet high, without a break—a great wooden structure surmounting the masonry. The second building ignited stood on the opposite side of the street, and the street was sixty feet wide. It should, however, be stated that if iron framing and iron covering plates are used in the construction of these roofs they are then made perfectly safe. It was a Mansard-roofed building that arrested the spread of the fire in Boston on its recurrence from gas explosions. Doubtless the authorities of Boston will hereafter require the use of iron.

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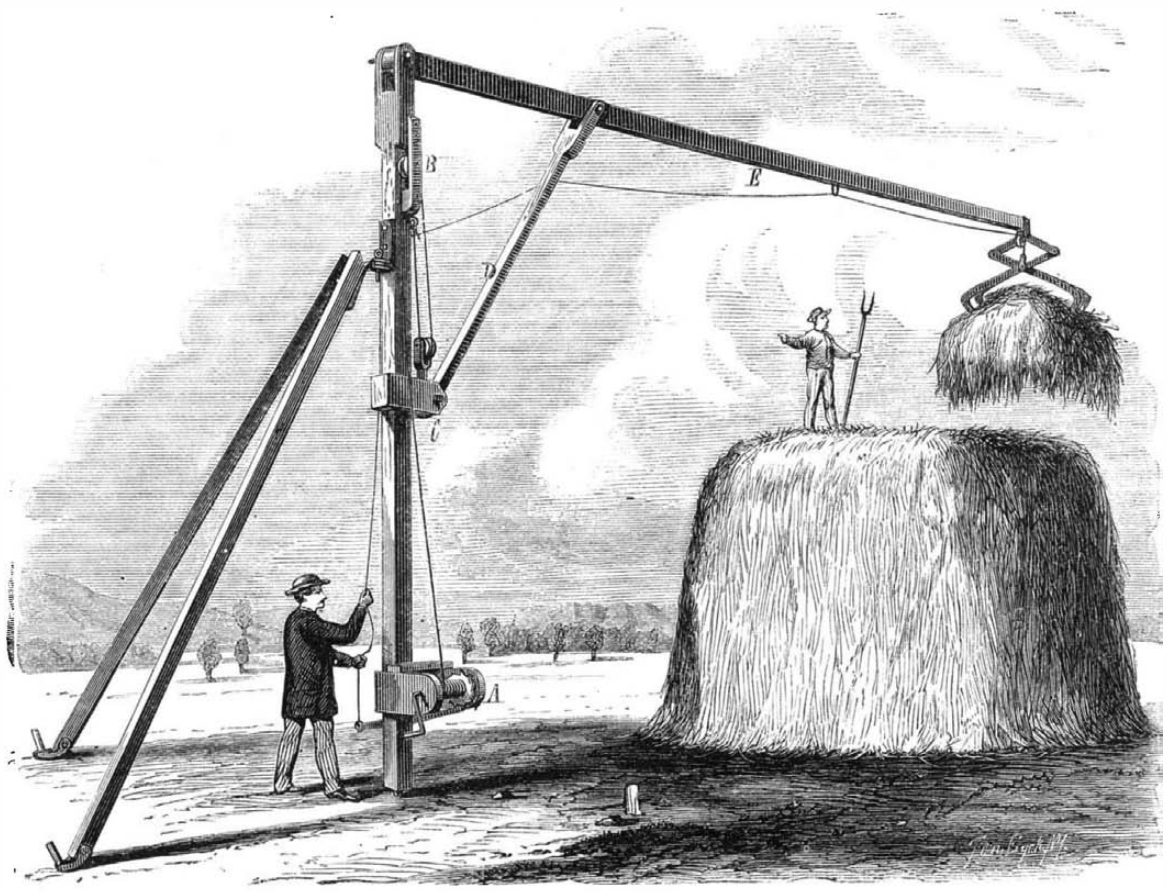
HAY AND STRAW STACKING APPARATUS.

The labor of stacking wheat, rye, oat, or barley straw and hay with an ordinary pitchfork is by no means slight, and indeed it is almost impossible to build stacks by hand high enough to prevent their becoming flat by settling, and their consequent rotting by the soaking in of the rain.

The invention herewith illustrated is designed to enable one man to place straw or chaff on a stack or pen eighteen feet high, as fast as the material can be furnished by the thrashing machine. It consists of an upright resting on a pivot and held erect by two braces, the upper ends of which are fastened in such a manner as to allow the upright to pivot readily in any direction. The lower extremities of the braces are firmly staked in the ground, as shown in the engraving. To the upright is attached a windlass, A, furnished with a ratchet and pawl, and carrying an elevating rope which passes up over a pulley, B, then down around another pulley on a carriage, C, and thence back to a staple on the upright, to which it is made fast. The carriage, C, is provided with friction rollers so as to slide freely up and down the upright, and connects with the lower end of the brace, D, the upper extremity of which is pivoted to the vibrating beam, E. The latter is hinged to the top of the upright as shown, and supports at its further end the tongs or grapple. The construction of this appliance is after the fashion of lazy tongs, and is readily understood from the engraving. To the point of intersection of the grappling arms is attached a cord, which passes through a loop on the swinging beam, and thence is led along down to a point beside the windlass.



BAIRD'S HAY AND STRAW STACKING APPARATUS.

To operate the device, the rope attached to the windlass is slacked until the beam, E, is inclined downward sufficiently to allow the tongs to grasp a quantity of straw. By pulling on the cord attached to the grapple, the jaws are opened to engage the material, and by slacking the line the tongs close of their own weight and firmly hold. The windlass is then revolved and the beam elevated to the proper distance, when the whole apparatus is turned on its pivot until in position to drop its load on the stack. The cord attached to the tongs is then pulled, causing the jaws to open and the straw to fall out. The machine is represented at this stage in our illustration—the figure at the foot of the upright being in the act of drawing the cord.

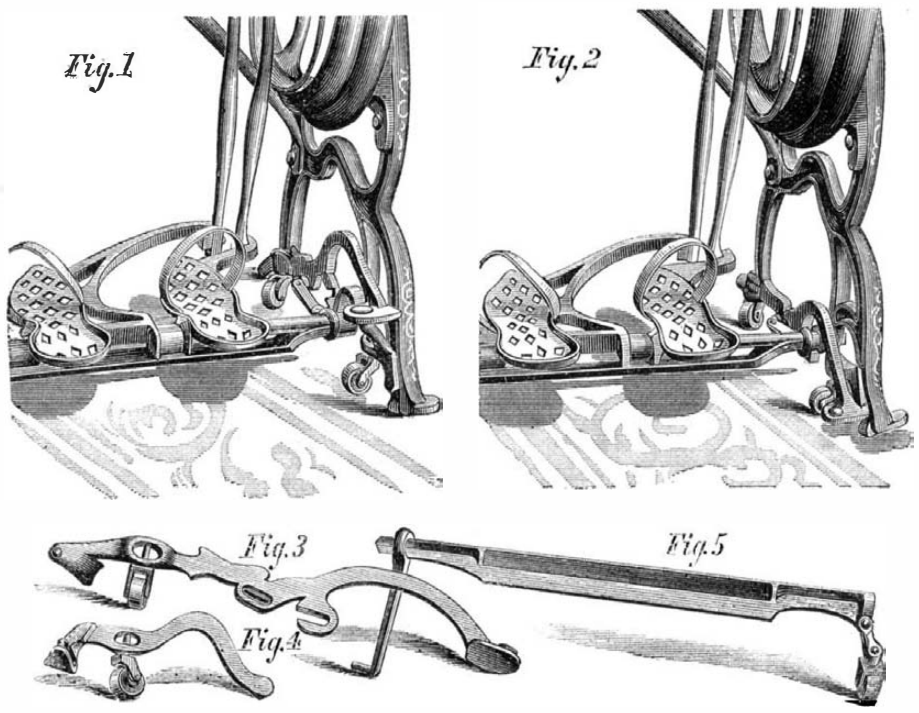
The principal advantages of this invention are the economy of labor and time which it must cause, and also the simplicity of its parts. It can readily be made by any farmer, with the assistance of an ordinary smith in the construction of the metal portions. It is not heavy or unwieldy to manage, and can be easily carried upon the shoulders of two men.

Patented through the Scientific American Patent Agency, September 24, 1872. For further information address the inventor, Mr. D. W. Baird, Lebanon, Tenn.

SEWING MACHINE TREADLE AND CASTERS.

Our engravings represent an improved form of treadle and also an ingenious mechanical combination of levers, whereby the sewing machine may be lifted on or off its casters at pleasure. From Figs. 1 and 2 the arrangement of the treadles is readily understood. There is necessarily an alternate motion, the cranks being on a quarter turn similar to those of a locomotive. The dead center is thus avoided, and the machine can be entirely controlled by the feet, which, acting separately, have a much more natural and less tiresome motion than usual.

Figs. 3, 4, and 5 represent the various portions of the device for actuating the casters, which, in Figs, 1 and 2, are shown respectively out of and in action. The lever (Fig. 3) is attached to the rear right hand leg of the machine, its forward end terminating in a foot plate. Fig. 4 is affixed to the corresponding forward leg, the arm of the lever being inwards, connecting with and moved by the foot lever, Fig. 3. Fig. 5 extends across the machine under the treadles. On its right hand end are an arm and pin, which pin enters the slot shown in the foot lever. A caster is attached to its left hand extremity by means of a short arm.



SEWING MACHINE TREADLE AND CASTERS.

In Fig. 1, the device being out of action, the foot lever is raised, the casters are consequently clear of the floor, and the machine rests firmly on its legs. In Fig. 2 the foot lever has been pushed down and is caught under the catch on the forward leg, which retains it until it is released by the hand. The rear caster fastened to this lever is therefore thrown into action, while the arms of the levers, Figs. 4 and 5, are forced down, causing the other two casters thereto attached to press on the floor and to act as fulcrums, so that the machine is raised fully half an inch, and may be easily moved from place to place. It will be noticed that the bar, Fig. 5, carrying the caster on the left, is made concave, so, that any oil, that may fall from the feeder or bearings, is caught and prevented from reaching the carpet. The treadles and the invention just described may be easily applied to all forms of sewing machines new or old.

These devices were patented through the Scientific American Patent Agency, the treadles under dates March 7, 1871, May 9, 1871, and Sept. 12, 1871, and the casters Oct. 17, 1871, by Mr. G. K. Proctor. They are now manufactured by the Salem Shade Roller Manufacturing Company, of Salem, Mass., John C. Osgood, agent, to whom further inquiries may be addressed.

The National Jubilee.

The one hundredth anniversary of American Independence is to be celebrated at Philadelphia, Pa., July 4th, 1876, in a becoming manner. One grand feature of the occasion will be the general exhibition of the products of American Industry.

The Centennial Commission has issued an address to the people of the United States, signed by President Joseph R. Hawley, for subscriptions to the fund of ten millions of dollars required to make the Centennial such a success as the patriotism and pride of every American demand. The Commission looks to the unfailing patriotism of the people of every section to see that each contributes its share of the benefits of an enterprise in which all are so deeply interested. It would further earnestly urge the formation in each State and Territory of Centennial organizations which shall in time see that county associations are formed, so that when the nations are gathered together in 1876, each Commonwealth can view with pride the contributions she has made to the national glory. "Confidently relying on the zeal and patriotism ever displayed by our people in every national undertaking, we pledge and prophesy that the centennial celebration will worthily show how greatness, wealth, and intelligence can be fostered by such institutions as those which have for 100 years blessed the people of the United States."

A Huge Snow Plow.

We see it stated that the Union Pacific Railroad is having built, at the shops in Omaha, a snow plow which, when finished, will be the largest and most powerful in the world. It is rapidly approaching completion, and in a few days will be ready for business. The trucks on which it is built are very heavy and strong, and were cast especially for this plow. The platform on the trucks is 22 feet long and 10 feet 6 inches wide, and is composed of solid oak timbers, 8 by 16 inches. These timbers are held together by 10 iron bolts 1¼ inches in diameter, which run crosswise. This solid bed is fastened to the transom beams by 40 bolts, 20 over each truck. The inclined slide, placed on the platform, is 22 feet long, and slopes at an angle of 30 degrees, and is held firmly to the bed by 40 bolts of an inch in diameter, and is supported from behind by inclined posts 5 feet long, 8 inches wide, and 16 inches thick. The entire length, from the rear of the platform end of the slide, is 32 feet. The slide is to be ironed, and an immense plow of the ordinary shape, 18 feet long, 11 feet wide, and 5 feet high, and covered with iron 3-16 of an inch thick, is to be securely placed upon it. On the point of this plow there is to be an iron plate, steel pointed, 11 feet long and 4 feet wide. This plate, of course, runs across the track, and only 1 inch above it. The rear of the platform will be boxed in, making a room twelve feet high, 11 feet wide and 10 feet long, for the purpose of keeping the snow out. It will be furnished with a door, so that, if necessary, it can be loaded with iron.

The monster will weigh fifty tuns, and will be operated by three of the heaviest engines on the road. The cost will be over $5,000. The design was gotten up by Mr. G. E. Stevens, superintendent of the car and building department, and Mr. J. H. Congden, general master mechanic of the road, who must have made it a study since last winter. There will be but very few snow drifts that this plow won't clean out; but if it ever jumps the track, it will be a pretty hard job to get it on again.

New Submarine Telegraph Cable.

Telegraph cable works have been erected on the Pacific coast, at San Francisco, and the Electrical Construction Company have completed the first section of their first job, to wit, a cable for the British Columbian Government. It is intended to be submerged under Rosario straits, to connect Vancouver's Island, at Victoria, with the continent.

The cable is 35,000 feet in length, and weighs about 30,000 pounds. The conductor is composed of seven No. 20 copper wires of 97 per cent fineness. The dielelectric consists of two coats of pure gutta percha $\frac{9}{32}$ of an inch in diameter, with intermediate coatings of Chatterton's compound. The gutta percha coil is served with two coats of machine banding, well tarred, and covered with a protecting armor of No. 9 galvanized iron wires, laid on spirally. Electrically tested, the resistance of the conductor is eight ohms, or B A units, per knot, and the resistance of the dielectric or insulating medium, 443,000,000 ohms per knot. The company has an order on hand to manufacture another cable 30,000 feet long, for the Puget Sound Telegraph Company, to establish a connection between Seattle and Port Townsend.

A PATENT called the "Electro Magnetic Motor" has, it is said, lately been tried on board the yacht Miranda, in the Birkenhead Great Float, and for the moment the result is of that nature which enables the inventors to state that at full power the motor made 1,400 to 1,500 revolutions per minute, while not connected with the screw. The yacht was worked for about five minutes, but before she could be brought up she had torn all the fastenings away from the great vibrator. The fact is, remarks the London *Daily News*, that the motor was twice too powerful for the yacht, and there is no doubt that it will take some time to bring the new invention into general use.

We have not a doubt as to the latter.

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THE VIENNA EXPOSITION.

We have had occasion of late to present to our readers a variety of evidence, showing that if the American inventor were to go to the trouble of exhibiting new improvements at the coming Exhibition, as desired by the Austrian officials, he would be simply a carrier of novel patterns to Vienna for Austrians to copy, for which they would make no acknowledgment and give him no compensation.

We have shown how fully the laws of the United States protect and encourage Austrian inventors when they come here for patents, and we have urged upon the Austrian government the propriety of simple reciprocity.

We have shown that American inventors could not be expected to take an active interest in the Exposition until the obnoxious Austrian laws are modified; and, until the change has been accomplished, we have urged that Congress ought to refuse to grant appropriations in furtherance of the Exposition undertaking. We have further indicated that there is no necessity for the office of United States Commissioner, supplemented by a host of subordinate officials; that American exhibitors, if they believe they can profit by forwarding their goods to Vienna, will need no solicitation from government employees to induce them to look after their own interests, nor should they require national assistance in pursuing their ends of private gain; and finally, that any setting aside of the public funds, to pay office-holders for services of no greater value or utility than pleasure trips to Europe, would be both unadvisable and impolitic. Such is about the substance of our hitherto expressed opinions, in answer to which the United States Commissioner, General T. B. Van Buren, sends the letter printed in another column.

Our correspondent does us an injustice in supposing that we would descend to personalities or couple the official acts with the private character of a gentleman, whose ability and patriotism we would not impugn, and to whose eloquent and forcible addresses we have listened with great pleasure and approval during the late campaign.

There are certain assertions in his letter, however, which seem to require comment at our hands. We are there stigmatized as a "show" paper, and as an illustration, reference is made to a large and handsome engraving of an improved loom, displayed on the first page of a recent issue of the SCIENTIFIC AMERICAN, of which ninety thousand copies have been printed. We admit that we are a "show" paper, and as such we take pride in presenting such fine illustrations as the one referred to. We know of no better means of laying before the public the best products of the national inventive genius, and we but perform a duty when we publish the same in the most attractive and complete manner. But the Commissioner is somewhat unfortunate in the selection of this particular device as evidence of our being a "show" paper. It happens that the loom is of remarkable and exceptional excellence and ingenuity, and has accordingly been patented in the United States and in some parts of Europe, but not in Austria. Americans avoid that country, because they can get no proper protection for their inventions. If the Austrian laws only offered suitable protection, doubtless the inventor of the large and splendid loom, to which the Commissioner alludes, would have made haste to apply for space at the Exposition; and we are free to say that the presence of that remarkable machine in the Vienna "show" would form a more novel and attractive feature, in the display of textile machinery, than anything of the kind that is likely to be there presented.

As the "especial champion" of inventors, a title in which we confess a pride, and which it is our aim to deserve, we consider that we advocate the cause of the entire country, and believe it to be to General Van Buren's directpersonal interest, as well as that of every other American citizen, that the rights of our inventors be fostered, sustained and defended.

Special stress is laid upon a trade mark treaty, with which the Commissioner had nothing to do, and which is of little importance compared with the interests of American inventors, still open to infringement and piracy by the Austrians.

In a widely distributed circular, issued from General Van Buren's office, we find the following remarkable statement:

"The Austrian government is exceedingly desirous that the United States shall be well represented, and makes *extraordinary concessions* to American manufacturers. The Austrian patent law *is practically abrogated* for the six months of the exhibition and two months following, and inventors are protected, by a special ordinance, against piracy of their inventions." Is there not a slight discrepancy between the intimation now made to us that a treaty may at some future time be concluded, and the direct assertion to the public in the above circular, that the objects of such treaty are now absolutely accomplished?

Would it not be well for the Commission to send out a new circular to manufacturers, showing that the previous circular of the Commissioner is *incorrect*; that the Austrians have *not* granted any "extraordinary concessions;" that the Austrian law has *not* been "practically abrogated," and that all that has been done in the premises, as the result of the zealous labors of the Commissioner on that point, consists, as he now states, in the sending of a draft of a proposed treaty from 51 Chambers street, New York, to the city of Washington?

The question of personal remuneration, General Van Buren places in a rather singular light. He states that he entered upon his duties, very well knowing there was no salary attached thereto, and actuated by a laudable motive to render service to his country. In the very next sentence he forgets his patriotic desires, and says he cannot, and insinuates will not, continue his functions at his own expense. Why did he undertake them? Moreover, he says that he has no claim for past services, and wants compensation for the future. But he has already boasted that a large number of articles for exhibition have been entered. Now, surely, it will not require a very extensive assortment of machines to fill thirteen thousand feet of floor space, and consequently the Commissioner's labors must be nearly completed. Therefore, having given a fair amount of time and trouble to his duties, why does he not, as he says he is willing to do, resign? We presume there are other gentlemen of leisure and means, and possibly of equal ability, who will accept the position. Why, we further ask, does our correspondent now appoint sixty-five asssistants to perform work which he was able to prosecute zealously, even when otherwise occupied in laborious political duties? Why seek to induce Congress to appropriate a large sum to pay a number of men for doing nothing, except making pleasure trips to Europe?

The word "show," and the insinuation that the Exposition is a grand advertisement, seems to wound our correspondent's sensibilities. "Show" is a plain Saxon term, and is synonymous with the high sounding "Exposition," while, as to the advertising question, we beg to refer the Commissioner to the following paragraph from a recent oration by Professor Barnard: "Since extensive advertising is admitted to be an essential condition to every industrial success, what possible expedient can be conceived better adapted to create expeditiously a demand, for any article having in it merit enough to recommend itself, than that of placing it before the world in a great international exposition?"

Since the above was written, we observe, by the daily papers, that Mr. Van Buren has made his appearance in Washington to advocate the appropriation of half a million of dollars for the expenses of himself and others to go to the Vienna show. In his remarks before some of the teachers of the District, he said that the Austrian Director of the Exposition, Baron Schwartz, had written several letters to him, urgently asking that models of American school buildings and apparatus might be sent to Vienna. But Mr. Van Buren intimated that, out of the proposed five hundred thousand dollars, only a small portion could be allotted for such purposes. We have no doubt of the latter fact. The most of the money will be required to pay for the European pleasure travels and hotel bills of the Commissioner and his superabundant retinue of assistants.

THE NOSE STRAIGHTENER.

Among the recent triumphs of mind over matter is the invention of a device for straightening crooked noses. We are not advised as to whether it will reduce the pug nose to the more elongated form, impart the stylish Grecian bend to vulgar noses, or transform the common-place idiotic nose into a thing of beauty, which is a joy forever. But we presume it will, for the patentee says so. Here is his advertisement, which we find in a London paper:

NOSE MACHINE.—This is a successful contrivance which, applied to the nose for an hour daily, so directs the soft cartilage of which the member consists, that an ill-formed nose is quickly shaped to perfection. 10s. 6d., sent free.—ALEX. ROSS, 248, High Holborn, London. Pamphlet, 2 stamps.

REMARKABLE STUPIDITY.

Through the courtesy of the Board of Management of the recent Fair of the American Institute, we have been forwarded a copy of a very singular circular lately submitted to that body. It consists in a petition, and begins by reciting the trite fact of the value of the compound marine engine, then goes on to state that the opinion of English engineers regarding the same is not conclusive, ingenuously remarks that if our merchant navy had the best engines it could compete with established rivals, and concludes with the remarkable request that tests be initiated in the machinery department of the Fair to determine the advantages of the compound system. The document bears the signatures of such firms as Williams & Guion, Pacific Mail Steamship Company, Spofford Brothers, Wm. K. Garrison, Murray, Ferris & Co., C. H. Mallory & Co., Atlantic Mail Steamship Co., H. B. Cromwell & Co., and others.

The only words which seem applicable to this astonishing composition are ignorance and effrontery. That men high in the mercantile world should not be posted in the fact that, for several years back, every new steamer that has been added to the foreign lines plying between this city and European ports has been provided with compound engines, has proved the same advantageous above all others, and has made equal speed with half the former consumption of fuel, is simply amazing. The logs of these vessels are open to their inspection, and if to this excellent evidence we add the long-since expressed opinions of not only the best European, but the first American, engineers, that the compound engine is by far the best machine extant for marine purposes, we should like to be informed what better proof these modern Rip Van Winkles require.

Were it not for the gratuitous slur upon the whole engineering profession, the concluding request would be actually funny. Here is a body of well known citizens, and among them the publishers of a scientific periodical, who at least ought to know better, deliberately asking the American Institute to require its judges to undertake experiments which are to be "of the highest value." Can anything, we ask, be more absurd? Do we understand that these gentlemen believe that the Institute, of all societies, through the medium of three civilian judges, presumably not the best talent the country can afford, backed by a mixed board of managers, the majority of whom know little or nothing on the subject, can give an opinion worthy of a moment's serious consideration, and above all of being placed superior to that of the best English and American scientific and mechanical authorities?

Were it not for the fact that this petition has been published and made the subject of comment by the daily press, we should pass it by in silence as an inconsidered emanation signed by men who were ignorant of the views it expressed; but as it has been given to the public, it is as well that its remarkable contents and purport be understood.

THE HORSE DISEASE.

The epizoötic still prevails in many places throughout the country, occasioning great inconvenience in the transaction of business, and throwing many laboring persons out of employment. In this city the distemper has abated; but a new form of disease has set in, having the character of dropsy. It has been attended with fatal results in many cases.

In respect to the epizoötic, the experience here was that the more quiet the animals could be kept, until their health and strength were fully restored, the better. In many instances, where horses were used contrary to medical advice, bad results followed. Commodore Vanderbilt has lost a twenty thousand dollar horse—Mountain Boy. The animal was so well that the Commodore drove him out. But immediately on returning, the horse sickened and died of pneumonia.

Dr. J. J. Woodward, of the United States Army, Washington, has made a careful microscopic examination of the organic forms derived from the air of stables, in that city, in which numbers of epizoötic horses are kept. He was unable to detect the presence of any germs other than those ordinarily encountered. Examination of the mucous discharge from the nostrils of the sick horses gave the same result. The popular belief that the sickness is due to the presence of certain spores of fungi, floating in the air, is not regarded as correct by Dr. Woodward and other microscopists.

OXYHYDRIC ILLUMINATION.

We have before alluded to the introduction of the oxyhydrogen light in this city, and the endeavors which are being made to supplant by it the ordinary gas now in use. In this connection the French *Bulletin du Musée* publishes a report of Mr. Felix Le Blanc, of Paris, based upon experiments made in that city and in Brussels, upon the gas of the *Société Tessié du Motay*, which is the same as that made by the New York Oxygen Gas Company. A flame of common illuminating gas is fed with a certain quantity of oxygen, by means of special burners delivering the common gas at the circumference, while the oxygen passes through the axis. The two gases, passing through distinct tubes, mix at the extremity of the burner.

The following is a brief *resumé* of the conclusions of Mr. Le Blanc, based on experiments made along one side of the Boulevards des Italiens and des Capucines, in Paris. He says: First: This illumination would not be possible over any extended surface with the gas used. Neither is the method economical, as it is notably more expensive than a quantity of ordinary gas giving equal light. The system should not be recommended for the lighting of public streets. Second: The assertions made by the society are not substantiated. It is inexact to say that, in the oxyhydric system, the combustion by the oxygen would be complete. It would require much more oxygen than could be consumed with effect, while the light would be greatly weakened. Third: If the ordinary gas be enriched by volatile hydrocarburetted vapors, previous to mixing it with oxygen, it will be necessary to surmount many difficulties in carburetting systems already well studied. The report goes on to give other reasons of the same tenor against the use of the gas, and finally considers its hygienic effect. M. Le Blanc says that without doubt such a means of illumination does not impoverish the air within circumscribed limits so rapidly of its oxygen as does ordinary gas. But to ensure complete combustion, the flame requires much more oxygen than is supplied, and consequently the light is much enfeebled; so that for this reason, he considers the healthfulness of the system to be by no means as great as is claimed. For uses in hospitals, ordinary

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gas with a good system of ventilation is preferred, on account of the unfavorable influences which might be exerted by a more than normal proportion of oxygen in the air. For metallurgical operations, this gas remains yet to be proved superior to air.

In spite of Mr. Le Blanc's unfavorable opinions, so far as we can judge from the results obtained by the use of oxy-hydrogen gas in New York, the system seems excellently suited for a variety of purposes. In one of our largest squares (Madison), a number of burners have been placed, which illuminate brilliantly a remarkably extended area, completely paling all other lights. The expense of the system is its greatest drawback for street lighting, though it is excellently adopted therefor. For the illumination of large buildings, however, we consider it unsurpassed. In the immense hall of the American Institute, in this city, this method has been employed during the recent fair; the quantity of light given far exceeded that of the twelve hundred burners of common gas ordinarily used, while the air in the building was noticeably purer and less oppressive. The cheerful effect of the illumination in rendering objects clearer to the vision, and also in causing colors to appear in greater brilliancy, closely resembled sunlight. The whiteness of the light greatly added to the beauty of the scene presented by the profusion of tastefully arranged articles in the exhibition, and formed a marked contrast to the murky yellow glare diffused by common gas. Double pipes were laid throughout the whole edifice, one serving the street gas and the other containing the oxygen, both having their outlet at single burners. The American Institute deserves the highest commendation for the admirable way in which it has thus proved the value and utility of this new system, though opposed in its introduction by serious obstacles. The oxygen had to be transported a long distance across the city from the works of the company manufacturing it, compressed in cylinders, which were placed in position and connected with the pipes, and yet a constant and efficient supply was uniformly maintained. There is little doubt that for interior illumination this gas will be extremely beneficial, both as affording an increased supply of oxygen and not impoverishing or vitiating the air, but actually rendering it purer, while the clear white light is far less hurtful to the eyes than the yellow and heated rays emitted by the ordinary street gas flame.

OUR CONCRETE DOCKS.

The work of constructing the new docks in New York is proceeding. The foundations, up to the surface of the water, are to be of concrete, made in blocks of from 50 to 75 tuns weight each. The composition consists of seven parts broken stone, three parts sand and one part of Portland cement. The concrete is cast in wooden boxes of the desired form and size, a central aperture being made in the block. After setting for a few days the boards are removed, leaving a block having a hard and comparatively smooth surface. The block is cast with central grooves for the introduction of the lifting chains, and after the blocks are placed one upon the other, the grooves are filled with cement, which adds to the strength of the entire structure. From the surface of the water up, granite blocks are to be used.

AIR GAS LIGHT IN ENGLAND.

The "Air Gas Light Co., Limited" is the title of a new bubble in the speculative share line, now extensively puffed in the London papers and said to be having success. Several prominent names are connected with the scheme. The air gas is made by passing air through a suitable hydrocarbon liquid, such as naphtha. This method, as our readers know, has for years been in common use in this country. But in England the plan is, practically, almost unknown, and the "Air Gas Light Co., Limited," are astonishing the natives with the light, and are also unloading their stock shares as fast as they can find purchasers simple enough to buy. The air gas "epizootic" had a good run in this country; but speculation therein ceased a long time ago. A reasonable, steady and extensive branch of industry is now carried on, in this line, all over the country. For country dwellings, stores and churches, the air gas furnishes excellent illumination at a small cost.

THE GROWTH OR EVOLUTION OF STRUCTURE IN SEEDLINGS.

Professor John C. Draper has recently published a pamphlet under the above title, showing from experiments made that in plants, as in animals, growth as applied to evolution of structure or organization of material provided is inseparably connected with oxidation. Regarding the lower organisms as fungi, the uniform testimony is that these plants at all times expire carbonic acid, while it is chiefly in the higher plants and especially those that contain chlorophyll or green coloring matter, that carbonic acid is absorbed and oxygen exhaled. Regarding these plants, it is stated that they exhale oxygen in the light and carbonic acid in the dark. This change, Dr. Draper considers, arises from the fact that two essentially different operations, have been confounded, namely: the actual growth or evolution of structures in the plant and the decomposition of carbonic acid by the leaves under the influence of light, to provide the germ or other materials that are to be organized; and he proposes to show that, by adopting this proposition of two distinct operations in the higher plants, all the apparent discrepancies regarding the growth of these plants are explained,

Two series of experiments were arranged, in which growth in the dark might be studied and compared with similar growth in the light. Peas were selected as the objects of trial, and each seedling was planted in a glass cylinder one inch in diameter by six inches long, loosely closed by a cork and filled to within half an inch of the top with fine earth or vegetable mold. The cylinders were then placed erect in a covered tin box in such a manner that the lower ends dipped into water contained in the box, while the whole of the cylinder, except the top, was kept in the dark. Warmth was was supplied by the external temperature, varying from 70° to 80° F., and the supply of moisture was retained uniform. One box containing five cylinders was kept in a dark closet, and another, exactly similar, placed in a window where the direct rays of the sun fell upon it five or six hours per day. Similar means were provided for determining the growth of the plants during night and day. One seed in each set failed to germinate. From the results obtained by the experiments, Dr. Draper arranges tables which give the following conclusions: In the seedlings grown in the dark, the time with which the structures were evolved in each plant is uniform—about the 17th day. Six periods of evolution are indicated, uniform in each plant, notwithstanding the difference in the weight of the seeds. In the first period, the growth consists of the formation, close to the stem, of two partially developed pale yellow leaves; in the second, the leaves are larger; in the third, a lateral stem projects, bearing two more leaves, between which is a tendril; in the fourth, the twig and tendril elongate; in the fifth, the tendril bifurcates; and in the sixth, it trifurcates. Stems, leaves, twigs, and tendrils are therefore evolved by the force pre-existing in the germ without the assistance of light. In the case of the seedlings grown in the light, the leaves and tendrils were many times larger and of a brighter green color, but the light developed no new structure. The average weight of dry plant and the proportion of root to total weight of plant was nearly identical. It was also found that, in the pot in which the peas were grown in the dark as well as those in the light, the soil was so poisoned by the roots that a second crop failed to sprout, thus affordiug another proof that the processes in the plants must have been similar.

From careful observation, the author concludes that the act of growth or evolution of structure is independent of light, and that the manner of growth during the day is similar to that at night. He says that the whole history of the plant, from the time the seed is planted to its death, is a continuous story of oxidation, except when sunlight is falling on the leaves. The seed is put in the ground and, during germination oxygen is absorbed and carbonic acid exhaled. If kept in the dark, only carbonic acid is exhaled, oxygen never; and the plant not only grows, but all visible structures, except flowers, are formed in a rudimentary condition. In the light, the growth during the night time is attended by the evolution of carbonic acid, while during the day time the bark of the stem and branches is throwing off carbonic acid. When flowers and seeds form, the evolution of carbonic acid attending this highest act of which the plant is capable is often greater than that produced at any time by animals. The final conclusion is that all living things, whether plants or animals, absorb oxygen and evolve carbonic acid or some other oxidized substances, as an essential condition of the evolution of their structure.

PROGRESS OF AMERICAN IRON INDUSTRY.

The iron business in the United States has never been in so flourishing a condition as at the present day. In Pennsylvania more iron is now being produced than by all the combined furnaces of England and the Continent of Europe, and yet the demand is far greater than the supply. A correspondent of the *New York Times* states that in the valleys of Eastern Pennsylvania there averages a furnace for every five miles, and still millions of dollars are being invested in further extension and development of the iron industry. All the iron masters are reaping golden harvests. Pig iron can be produced at an average first cost of from $13 to $17 per tun, according to location and conveniences at hand. A clear profit of from $35 to $45 per tun is made, and when the produce ranges from one to two hundred tuns per day, the aggregate gain of a day's business can be readily calculated. This very encouraging state of affairs is considered to be due in part to the fact of the country being thrown upon its own resources, England having discontinued shipping pig metal hither altogether, because under the present state of the market in Europe she cannot afford to do so. In the cheap times of the Kingdom, ore was plentiful and labor was to be had at very little cost. Now the mines are old and well worn; native ore is rare and labor at advanced rates, so that Spanish ore is imported, which, by the time it reaches English furnaces and is smelted by English labor, is advanced fully 100 per cent over the first cost of produce. One of the most prominent operators in Pennsylvania publishes the information that for the first time in the history of this country, America has shipped iron to England with advantage.

Our supply of ore is unlimited. In nearly every State new veins are being developed, and in almost every case an accompanying discovery of coal is announced. The track of furnaces will eventually find its way to Western Virginia, thence to Texas, and in time we may look to the Territories of the great West for our valuable pig metal. This year's produce of iron, there is every reason to believe, will exceed that of last year by fully a million tuns, and if the producing capacities continue in like proportion with the present increase, the following years will swell the figure by two or three millions more.

IN Georgia, the picking of the cotton crop is rapidly going forward, and if the weather continues as fine as it now is, the whole of it will be gathered by the 15th or 20th of November. Two thirds have already been gathered, ginned, baled, and are either on the road to market or already there. So it seems that the caterpillars have not taken all of the crop.

Shoeing Oxen for Pavements.

In regard to the matter of shoeing oxen so that they can work on pavements, Mr. P. P. Sibley writes to the Boston *Journal* as follows:

"As I have worked twenty-four years at blacksmithing, and claim to be master of my trade, I will give my opinion in regard to shoeing. In the first place, turn the shoe as usual, only a little thicker at the toe, then weld together at the toe, and put a calk on the toe about an inch long and one quarter inch high; heel calk the same. In setting, care should be taken to keep each claw in its natural position, that is, spreading them as the ox would usually stand, and also fit the shoe well. Put six nails in each half of the shoe. I have always used the Vulcan No. 6 nail. I have shod cattle in this way that were driven through a river twenty times a day, and did not lose a shoe for weeks, when if shod the common way they would soon become lame."

A New Steamer.

The Victoria is the name of a new and splendid steamer, lately arrived at New York on her first voyage from Liverpool. Her burthen is 3,600 tuns. She was built on the Clyde by Messrs. Alexander Stevens and Sons, her length being 380 feet, breadth of beam 42 feet, depth of hold 30 feet, and having engines, two in number, of the compound vertical direct acting principle. The cylinders of these are 108 inches low pressure and 60 inches high pressure, with a stroke of four feet. Steam is supplied from six tubular boilers, with superheaters for each. The propeller is 18 feet in diameter and 20 feet pitch. Then there are smaller engines for pumping and deck purposes, weighing anchors, loading and unloading cargoes. Fire engines are all over the ship, and the forward part of the deck is so constructed that the seamen, in the worst of weather, may not suffer from exposure in their duty.

PATENT DECISION.

The Supreme Court of the United States in the suit of Wells *vs.* Gill, Hat Body Machine, has sustained the Wells patent. One of the allegations was that the Commissioner of Patents had, in the reissue of the Wells patent, granted claims for subject matter not contained in the original patent. The Court refused to go behind the Commissioner's action.

PROFESSOR JAMES HADLEY.

This learned and distinguished linguist died at New Haven, Conn., November 14, 1872, in the 52nd year of his age. He occupied the professorship of Greek at Yale College, was President of the Oriental Society, and enjoyed a worldwide reputation as a master of languages.

The Epizootic among Deer.

We learn from our Western exchanges that the dreadful horse disease, the "epizoötic," has now taken effect upon the wild deer, and is likely to diminish our supplies of venison and skins. Many deer are found dead in the woods. No deer is shot now, and when one is found dead the skin is removed to be made into leather. The horses used in the woods are all sick, and the men treat them to hemlock fumigations and sweats, with good results.

NEW STEAM LAUNCH.—A trial of a steam launch, built for the government of Costa Rica by Messrs. Yarrow and Hedley, of Poplar, England, recently took place on the Thames. This little steamer is 43 feet in length, and the chief feature of its construction is that it is built in three entire sections, so as to enable it to be thoroughly tested under steam in England, and can be afterwards divided into three separate pieces for shipment, each section being of such a size as to enable it to be lowered down a vessel's hatchway. At the joints there are double bulkheads, rendering each section buoyant in itself. This method of construction avoids the necessity of obtaining skilled labor to put the launch together and set to work on arrival at its destination, thereby rendering the introduction of these useful little steamers possible in many foreign parts otherwise impracticable. The launch in question maintained easily a speed of ten miles an hour on a consumption of half a hundredweight of coal.

The Boston Fire---Newspaper and Magazine Offices Burned out.

The following is the list of the newspapers, magazines, etc., which were located in the burned district:—*American Homes*, monthly, 51 Water; *American Painter*, weekly, 58 Congress; *American Railway Times*, weekly, 66 Federal; *American Union*, weekly, 63 Congress; *Ballou's Monthly Magazine*, 63 Congress; *Banner of Light*, weekly, 158 Washington street; *Boston Almanac and Business Directory*, and the *Boston Directory*, 47 Congress; *Cabinet Maker*, weekly, 50 Congress; *Christian Monthly*, 19 Lindall; *Freemason's Monthly Magazine*, 51 Water: *Gleason's Home Circle* and *Gleason's Monthly Companion*, 42 Summer; *Harness and Carriage Journal*, weekly, 40 Pearl; *Boston Journal of Chemistry*, monthly, 150 Congress; *Little Christian Monthly*, 19 Lindall; *Monthly Novellette*, 63 Congress; *New England Postal Record*, 40 Liberty square; *Saturday Evening Gazette*, weekly, 37 Congress; *Pilot*, weekly, 19 Franklin; *Shoe and Leather Record*, weekly, 40 Pearl; *Shoe and Leather Reporter*, weekly, 40 Pearl; *Shoe and Leather Trades Journal*, weekly, 3 High; *Sierra Magazine*, monthly, 100 Pearl; *Temperance press*, weekly, 46 Congress; *Transcript*, daily, 150 Washington; *Yankee Blade*, 40 Liberty square; *Waverly Magazine*, 50 Lindall; *Journal of Applied Chemistry*, monthly, 40 Pearl.

B. F. Chandler, C. E., of United States Navy Yard, Portsmouth, N. H., writes us that the large cotton mill in that place is lighted with gas made from paraffin, which proves to be far preferable and 50 per cent cheaper than coal.

A SCIENCE teaches us to know; an art to do. In art, truth is a means; in science, it is the end.

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SCIENTIFIC AND PRACTICAL INFORMATION.

INOCULATION WITH DEAD BLOOD.

It is well known that surgeons are often seriously injured by accidentally cutting themselves with instruments that have been recently used for dissecting purposes. The wounded part swells, and mortification often ensues, necessitating amputation and sometimes causing death. In order to determine the poisonous properties of this putrid blood, M. Davaine communicates to *Les Mondes* the result of several experiments made upon rabbits. The liquid used was the blood of an ox that had been ten days slaughtered. This, by subcutaneous injection, he administered to his subjects in varying quantities, obtaining by successive dilutions with water the most infinitesimal attenuations. Killing one animal, he would take its infected blood and force the same into the veins of another, and so on until he reached what he terms the twenty-fifth generation. On this last experiment he says: "Four rabbits received respectively one trillionth, one ten-trillionth, one hundred-trillionth, and one quadrillionth of a drop of blood from a rabbit belonging to the preceding generation that had died from the effects of a one trillionth dose. Of the four, but one animal died—that which received the one ten-trillionth. It appears, then, that the limit of the transmissibility of the poison in the rabbit reaches the one trillionth part of a drop of decayed (*septique*) blood."

INDEPENDENT CAR WHEELS.

In the Polytechnic Exhibition of Moscow is now exhibited a new method of arranging the axletrees of railroad cars or other vehicles, in order to facilitate the passage around curves of very short radius. The axle is cut in the middle and the two portions are reunited by means of a long metallic sleeve. The extremities of the axle consist of a pivot and socket, so that their only point of contact is directly in the center of their junction. Shoulders or flanges are arranged which retain the halves within the sleeve. The two portions of the axle are thus allowed to work at different velocities, by which it is believed that the successive shocks occasioned by the sliding of the wheels on the rails in rounding short curves will be avoided. This system is being applied to a tramway between Petrofsky Park and the gardens of the exposition, on which there are curves of from 30 to 50 meters radius.

The invention is very old and has long been known in this country. One of the most approved examples is the "Doty-Miltimore Compound Car-axle," which is now used on several of our railroads. It is stated that 104 patents have already been granted in this country upon car axles and wheels having the above idea in view, to wit, making car wheels to run independently.

COLORING THE EYE.

Dr. R. J. Levis, of the Pennsylvania Hospital, has devised a means of coloring opacities in the cornea of the eye. He says: "The disfigurement of the glaring white opaque spaces of the cornea can be cured by indelibly tinting, so that if central, they shall show the blackness of the natural pupil, or if peripheral in location, the color of the underlying iris may be most deceptively imitated. Should even the entire cornea be opaque, a very natural imitation of the appearance of the whole circle of the iris and the pupil can be accomplished." The instrument used is a bundle of from three to six very fine sewing needles inserted into a handle. For coloring matter, ordinary water pigments are used, rubbed to a pasty consistence and mixed with a little glycerin. For the black of the pupil, Indian ink is employed. The surface of the opaque spot being wiped clear from moisture, the paint is applied thickly over it with a small pencil. The needle points are made to penetrate repeatedly and rapidly in varying directions, until much of the opaque surface is gone over with the pigment. Two or more repetitions of the process are required. The operation is said to be painless, and as the coloring matter is regularly tattooed into the tissues, it cannot be washed out by tears.

THE OSCILLATIONS OF SHIPS MADE USEFUL.

M. Guzman, of France, has lately published in the *Annales du Génie Civil* an elaborate essay, proposing to utilize the inertia of a suitably suspended and freely oscillating body, such, for instance, as a heavy pendulum so placed on a vessel as to be swayed by the action of pitching and rolling, and, by suitable mechanism connected with the pendulum, to apply the power to working pumps, etc. This is a very old idea, and is, we believe, an American invention. At any rate it is the basis of several different patents in which the idea is embodied. One would almost suppose that Mr. Guzman must have had before him, in preparing his essay, a copy of United States patent No 18,192, of September 15, 1857.

This invention consists simply in a heavy weight attached to a swinging shaft. As the former sways to and fro, by the movement of the vessel, it actuates gearing which communicates motion to a shaft which operates a pump and keeps the ship dry. In the back numbers of the SCIENTIFIC AMERICAN will be found several other forms of the same idea illustrated and explained.

The essay of Mr. Guzman is only one of hundreds of examples in which Europeans, having hit upon some old American invention, have put it out in a new dress and passed it around through the press as a novelty.

NEW BOOKS AND PUBLICATIONS.

HOW TO PAINT: A complete Compendium of the Art. Designed for the Use of the Tradesman, Mechanic, Merchant and Farmer. By F. B. Gardner, Author of "The Carriage Painter's Manual." Price $1.00. New York: Samuel R. Wells, No. 389 Broadway.

A neatly printed, convenient little book, thoroughly practical in all its nstruction. Many excellent recipes are contained in it.

Facts for the Ladies.—Mrs. O. Pierce, Boston, Mass., has used her Wheeler & Wilson Lock-Stitch Machine since 1859, without repairs, earning from $12 to $15 a week, making men's clothing. See the new Improvements and Woods' Lock-Stitch Ripper.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notice exceed Four Lines, One Dollar and a Half per Line will be charged.

Diamond Carbon, of all sizes and shapes, furnished for drilling rock, sawing stone, and turning emery wheels or other hard substances; also Glazier's Diamonds, by John Dickinson, 64 Nassau St., New York.

Wanted—To purchase good Second Hand Wood and Iron Lathes. Address Louden Mf'g Works, Fairfield, Iowa.

Wanted—A position in a Cement Factory; or in an Artificial Stone Works. Address, Owner, 378 Gold Street, Brooklyn, N. Y.

Permanent Photograph Printing, just what is wanted by Manufacturers. Send for Circular to Amer. Photo Relief Printing Co., 1002 Arch St. Philadelphia, Pa. John Carbutt, Sup't.

Winans' Boiler Powder, 11 Wall St., New York. Certain cure for Incrustations—17 years best in the market.

Valuable Patent Right for Sale. The amusing Toy Attachment for Pianos, illustrated in SCIENTIFIC AMERICAN, October 28th, 1871. Address G. L. Wild & Bro., 420 11th St., Washington, D. C.

Boston Fire! Goodnow & Wightman, 23 Cornhill, were not burned out, and are ready to fill all orders for Tools and Materials. Catalogues were all burned, but will have more in about two weeks.

For Sale—An interest in an established business. Capital required, seven thousand dollars. Enquire of Messrs. Fine & Gallaher, Counsellors at Law, No. 7 Murray St., New York.

First Class Steam and Vacuum Gauges, Engine Registers, Davis' Recording Gauges. New York Steam Gauge Co., 46 Cortlandt St., N.Y.

Water Front for Factories, Rope-walks, Lumber-yards, &c.—Lots for Sale or Lease. Blocks of lots on Newtown Creek, near East River, adjoining New York and Brooklyn Cities; prices $300 to $1,000; terms easy. Apply to S. R. Schieffelin, No. 15 East 26th St., New York.

A thorough machinist, who is an experienced foreman, and first class mechanical Draftsman, desires employment. Address A. G. Edwards, Oshkosh, Wisconsin.

A first class Improved Water Power for Sale, in Hawley, Pa., on Erie R. R. & D. & H. Canal. Address Northrup Bros., Hawley, Pa.

Water Wheel Regulators—warranted, or no sale. Address F. B. Bowen, Pawtucket, R. I.

Soluble Glass, Water Glass, Liquid Quartz, Silicates of Soda and Potash for Concrete Cements, Fire and Waterproofing, manufactured by L. & J. W. Feuchtwanger, Chemists, 55 Cedar St., New York.

Oxide of Manganese, highest test, from our own mines, for Steel manufacturing, Patent Dryer, Paints and Glass, at lowest prices, by L. & J. W. Feuchtwanger, 55 Cedar St., New York.

Nickel Salts, double Sulph. and Ammonia, especially manufactured for Nickel Plating, by L. & J. W. Feuchtwanger, Chemists, 55 Cedar St., New York.

Four Brick Machines, Combined with Steam Power (Winn's patent), makes 40 M. per day, for sale at a bargain. Address the manufacturers, John Cooper and Co., Mount Vernon, Ohio.

Engine and Speed Lathes of superior quality, with hardened Steel bearings, just finished at the Washburn Shop, connected with the Technical Institute, Worcester, Mass.

Hand Lathes. C. F. Richardson, Athol Depot, Mass.

I will Remove and prevent Scale in any Steam Boiler or make no charge. Engineer's Supplies. Geo. W. Lord, Philadelphia, Pa.

Absolutely the best protection against Fire—Babcock Extinguisher. F. W. Farwell, Secretary, 407 Broadway, New York.

Hydraulic Jacks and Presses—Second Hand Plug Tobacco Machinery. Address E. Lyon, 470 Grand St., New York.

Steel Castings "To Pattern," from ten pounds upward, can be forged and tempered. Address Collins & Co., No. 212 Water St., N. Y.

Ashcroft's Original Steam Gauge, best and cheapest in the market. Address E. H. Ashcroft, Sudbury St., Boston, Mass.

Heydrick's Traction Engine and Steam Plow, capable of ascending grades of 1 foot in 8 with perfect ease. The Patent Right for the Southern States for sale. Address W.H.H.Heydrick, Chestnut Hill, Phila.

The Berryman Steam Trap excels all others. The best is always the cheapest. Address I. B. Davis & Co., Hartford, Conn.

Wanted—Copper, Brass, Tea Lead, and Turnings from all parts of the United States and Canada. Duplaine & Reeves, 760 South Broad Street, Philadelphia, Pa.

The Berryman Heater and Regulator for Steam Boilers—No one using Steam Boilers can afford to be without them. I. B. Davis & Co.

T. R. Bailey & Vail, Lockport, N. Y., Manf. Gauge Lathes.

Brown's Pipe Tongs—Manufactured exclusively by Ashcroft, Sudbury St., Boston, Mass.

Windmills: Get the best. A.P.Brown & Co., 61 Park Place, N.Y.

Ashcroft's Self-Testing Steam Gauge can be tested without removing it from its position.

The Berryman Manuf. Co. make a specialty of the economy and safety in working Steam Boilers. I. B. Davis & Co., Hartford, Conn.

Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.

Belting as is Belting—Best Philadelphia Oak Tanned. C. W. Arny, 301 and 303 Cherry Street, Philadelphia, Pa.

Boynton's Lightning Saws. The genuine $500 challenge. Will cut five times as fast as an ax. A six foot cross cut and buck saw, $6. E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

For Steam Fire Engines, address R. G. Gould, Newark, N. J.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D.Andrews & Bro. 414 Water st. N.Y.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Presses, Dies & all can tools. Ferracute Mch. Wks, Bridgeton, N.J. Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, &c.

Kahnweiler's Cotton Seed Huller, $175. Is warranted perfect in its operation. Send stamp for circular to R. H. Allen & Co., New York, manufacturers and dealers in Agricultural Machinery of every kind.

A party intending to engage extensively in the hose knitting business wishes to obtain full information as to the best machines, prices etc. Address H. Hutzler, 333 Central Avenue, Cincinnati, Ohio.

Gear Wheels for Models. Illustrated Price List free. Also Materials of all kinds. Goodnow & Wightman, 23 Cornhill, Boston, Mass.

Agricultural Implements and Machines for Fall and Winter use. R. H. Allen & Co., 189 & 191 Water Street, New York.

For 2, 4, 6 & 8 H.P. Engines, address Twiss Bro., New Haven, Ct.

Wanted—A reliable and intelligent man of good address, to engage in a desirable and lucrative business producing from $1,500 to $5,000 per year. Address J. B. Ford & Co. New York Boston; Chicago or San Francisco.

Steam Boiler and Pipe Covering—Economy, Safety, and Durability. Saves from ten to twenty per cent. Chalmers Spence Company, foot East 9th Street, New York—1202 N. 2d Street, St. Louis.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

Machinists; Illustrated Catalogue of all kinds of small Tools and Materials sent free. Goodnow & Wightman, 23 Cornhill, Boston, Mass.

Complete Water Gauge for $4. Holland & Cody, 8 Gold St., N.Y.

Gatling guns, that fire 400 shots per minute, with a range of over 1,000 yards, and which weigh only 125 pounds, are now being made at Colt's Armory, Hartford, Conn.

Perfection—Patent Ears for Elliptic Spring Heads. Address George P. Cleaves, Concord, N.H.

For hand fire engines, address Rumsey & Co., Seneca Falls, N.Y.

A New Machine for boring Pulleys, Gears, Spiders, etc. etc. No limit to capacity. T. R. Bailey & Vail, Lockport, N. Y.

Notes & Queries

[We herewith present a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—How can I best stop small leaks in a rubber gas bag?—B. S. P.

2.—Will some one please inform me whether black ink writing, faded by age, can be restored so as to be read; and if it can be what is the process?—H. E. C.

3.—How can I best prepare lime cylinders for use in producing the oxyhydrogen or calcium light? Can air-slaked lime be utilized for the purpose?—B. S. P.

4.—Can any one of the readers of the SCIENTIFIC AMERICAN give me a recipe for making a cheap and permanent silver plating for brass ware? I have tried several patent preparations, but the coating does not last long.—J. W. C.

5.—What is the best and cheapest way to remove old paint or varnish from carriages, preparatory to repainting and varnishing?—M M. H.

6.—How can I galvanize cast iron? I wish to have your way of doing it, as all the recipes from your paper I have tried came nearer the mark than any others.—C. I.

7.—I am experimenting in photozincography and collotypy; can any of your numerous readers inform me what kind of a press I should use, whether platen or roller, and whether an ordinary copper plate could be successfully printed with from the same press? What is the composition of the ink to be used?—A. G., Jr.

8.—Can any one give me information concerning the manufacture of flour starch? Would it pay a farmer to make it on a small scale? How many pounds of starch can be extracted from a bushel of ground wheat?—J. S.

9.—I am using a copper and tin composition for a sliding box, and find it wears out rapidly. I have thought of using *lignum vitæ*, or some other hard wood, instead of metal. Will some one inform me whether any kind of wood would wear longer than the above named metal for such a place? I have noticed that some manufacturers of steam fire engines use *lignum vitæ*, but do not know the reason why they use it. Can any one inform me?—J. M.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of purely business or personal nature. We will publish such inquiries however, when paid for as advertisements at $1·50 a line, under the head of "Business and Personal."

ALL references to back numbers must be by volume and page.

P. H. A. enquired in our paper of November 16 whether there was any danger of bursting the barrel of a rifle in case the ball is not rammed down to the powder. The answer was that the fact that the ball was not rammed down does not increase the liability of bursting the barrel. It should have read "does increase" the liability of bursting. The theory of gun men is that, when there is any considerable space between the powder and ball, the gas engendered by the charge strikes the ball a more sudden blow than when the ball is rammed home to the powder. Accidents from bursting, due to insufficient ramming, or placing two charges or balls in the gun, with air space between, or placing wads or other plugs in the barrel, not in proximity to the powder, are of frequent occurrence Shot guns, which have light, thin barrels, especially near the muzzle, have been known to burst on firing if the muzzle was simply plugged with snow

C. M. B. says: I am about to have a particular kind of muzzle loading rifle made, and there are some points that I wish to be informed upon before giving the order. The following are the points: How thick ought a steel rifle barrel be to carry a two ounce concave-conical bullet with perfect safety, allowing as much powder as would burn in the chamber? What would be the proper charge of powder to use for such a bullet in order to shoot it with all the force that the barrel would stand? What would the weight of such a barrel be, allowing it to be as light as possible and perfectly safe, that is, as safe as the ordinary rifle? I have tried hard to find this matter out here, but with poor success. I have consulted some gunsmiths, but they could give me no definite answer, and guess work won't do in this case. You may be sure I shall anxiously look through your column of answers to correspondents for the time to come. Answer: In thickness the barrel should be twice the diameter of the bore at the breech, and one and three fourths the diameter of the bore at the muzzle, and the barrel should not be less than thirty inches long in order to burn all the powder. The barrel should be made of decarbonized steel of good quality. The weight of the barrel will depend upon its length, which is not stated by you. But you can easily settle the weight. The quantity of the powder should be equal in weight to about one sixth the weight of the bullet.

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G. L. H.—What will be the best practical method to decompose water into oxygen and hydrogen, filling separate vessels respectively? Answer: The most convenient method of decomposing water is by means of the galvanic battery. Place the ends of the two wires in water, near each other, and over each wire a collecting jar or tube. The two gases will then rise, hydrogen in one, oxygen in the other.

R. H. D. says: You might add to your article on paper hanging: Cover your table with newspapers and renew when soiled, instead of cleaning the table so often, and use sizing of vinegar and water before pasting the walls.

A Subscriber asks if tea made of burdock root will purify the blood without thinning it too much? Answer: This root is considered excellent for disorders of the blood, but we advise you to consult a physician in respect to its use.

W. C. Van N. says: I am troubled with rheumatism in my feet. Will some one state a remedy? I have heard that lemons are good. How many must I eat a day, and at what hours? Answer: Fifteen lemons a day, eating one every hour, will probably quiet your rheumatism, and all other troubles, in a short time. But if you wish to live for a while longer, let the lemons alone and consult a firstrate physician.

W. D., of N. C., sends us a mineral specimen, asks what it is, and says he has leased for ten years the land where it is found. Answer: The mineral is quartz rock, colored red by oxide of iron. The silvery particles in it are mica, and of no value.

F. D. H. asks: Can iron be plated with copper by the means employed to plate metals with silver, using a solution of sulphate of copper instead of the silver solution? Answer: Yes.

F. D. H. asks: How can I remove mercury from the surface of brass, which has become coated by accident, without injury to the same? Answer: By heating the article. Look out that you do not inhale the mercurial fumes.

E. H. asks in what way galvanized iron can be treated to resist the action of salt. Answer: You can protect the iron by means of varnish. You do not state, however, the circumstances under which the iron is used.

F. H. N. requests us to inform him whether the report of one gun can be heard as far as the report of two, fired simultaneously, the guns to be of the same size, charged the same, etc. The question arose thus: A. claimed that the solos sung at the Boston Jubilee could be heard just as far as the choruses, provided the voices were all of the same power. Certainly the report of two guns will make a louder noise, then it consequently would transmit the sound farther. Answer: Your conclusion is correct. The report of two guns will be louder than one, and will consequently be heard further. A. is wrong about the Jubilee singers. One voice could not be heard at so great a distance as several voices of the same power.

Professor Ott writes as follows: In your issue of November 9, I find it stated among the answers to correspondents that the process of Mallet for manufacturing oxygen has not as yet come into practical use. Permit me to inform you that the same has been in use in Frankfort-on-Main for about two years, the oxygen being employed for Philipps' new system of illumination, which has also been patented in the United States. The experiments made with the first apparatus of Mallet yielded a gas consisting of 97·3 volumes of oxygen and 2·7 of nitrogen, an amount which for all technical purposes is of no consequence whatever.

In answer to A. F. S., asking how to clean stove pipes of soot, I would recommend the following: Place a piece of newspaper with a spoonful of gunpowder enclosed, beneath the entrance to the stove pipe, removing the tops on the back near the pipe. Let the paper have a long end; light it and then retire after replacing the tops. The explosion of the powder will bring the soot down.—H. B.

W. K. L., query 2, page 281, will find that silicate of soda is soluble in water after becoming hard. The trouble is that people generally do not understand the difference between silicate of soda and water glass. The makers of this useful article decline to sell it at retail; where can it be procured in small quantities?—T. E. L.

In a recent issue you suggest to artists and draftsmen the use of "ordinary collodion, sold by all dealers in photographic materials" as a protection to pencil and crayon drawings. Would it not be best to use plain or unsensitized collodion, as the free iodine in ordinary collodion, for photographic use, would seriously stain or tint a delicate drawing? The solution should contain less cotton than for ordinary use. The following is a good formula; Sulphuric ether, 1 oz., alcohol (95 per cent), 1 oz., soluble gun cotton, 4 grains. I have used it with excellent results.—G. G. R., of N.Y.

To A. T. M., query 6, page 314. Dissolve about 60 grains of carbonate of ammonia in the water used for mixing with 1 pound of flour. Knead well, and bake immediately; all the ammonia will volatilize. Or mix dry, with each pound of flour, about 36 grains tartaric acid and 42 grains carbonate of soda, add water, etc. Knead quickly, place in tins and bake. Bread also used to be made by using carbonate of soda and muriatic acid; but the introduction of the large quantity of common salt so formed was was considered injurious to the health.—E. H. H., of Mass.

To O. S., query 11, page 314. Ozone papers are made by dipping unsized paper into a solution of 1 part iodide of potassium, 10 parts wheat starch and 100 parts distilled water. Dry rapidly, cut into slips, and keep in a well stoppered bottle in the dark. To use: moisten a slip and hang in a cage of wire gauze, when the effect of any ozone will be indicated by the depth of color produced.—E. H. H., of Mass.

To D. R. W., query 12, page 314. There is nothing dangerous about the processes named for silvering glass.—E. H. H., of Mass.

To O. S., query 21, page 314. Saturate the outside of your vats—especially the bottoms—with a solution of corrosive sublimate, and, when dry, coat well with paint. You need not fear any ill effect from the sublimate on the contents. It will be also well for you to see that there is some ventilation underneath. The corrosive sublimate is about the best preservative of wood against decay known.—E. H. H., of Mass.

To T. J. S., query 26, page 314. Steep, for a while, in a dilute solution of permanganate of potash; the broom corn will become brown. Place then in a hot dilute mixture of muriatic acid, and it will be quite white.—E. H. H. of Mass.

To O. S., query 11, page 314. Boil common starch into a weak solution of iodide of potassium, to make a solution of any convenient consistency. Brush this evenly over any good paper; druggists' white wrapping is good. Dry and preserve. To use it, moisten the slips and expose. Free ozone will, if present, decompose the iodide of potassium, coloring the starch a deep blue, forming iodide of starch.—S., of N. Y.

To E. E., of R., India, query 5, page 314. Such a machine as an ordinary hay cutter answers very well for cutting leaves. Have four or more blades, instead of two, and so cut the leaves to the width you want.—E. H. H., of Mass.

To E. E., of R., India, query 9, page 314. The senna leaves after drying on sieves by currents of air or in a stove, are prepared for the market by picking out the leaflets, stalks, pods, and the leaves of weeds or other herbs, etc., thus being sure that it is free from argel leaves, with which it frequently is largely adulterated.—E. H. H., of Mass.

W. B. N., query 5, page 298, will want 40 horse power to drive sixteen 30 inch 12 gage circular saws through 6 inch to 10 inch stocks, and he will require two rubber belts, 12 inches wide, 5 ply thick.—J. H. M., of P. Q.

To J. H. L., page 314. A very good way to imitate ground glass is to take a ball of fresh putty, as large as a small apple, and press it to the inside of the glass, repeating the operation until the whole is sufficiently coated. It will require a practical eye to distinguish the result from ground glass.—A. B., of U. S.

To A. P. C., query 23, page 314. All parts of the circumference of a locomotive wheel travel around the axle at the same rate. But one point rests upon the rail, not moving forward for the time being. All the other points are moving forward with varying rates, the top point moving most rapidly. Thus every point of the wheel describes a cycloid but, being in different parts of the cycloid at the same time, advance accordingly.—Le R. F. G., of Mass.

To E. E., of R., India, query 28, page 314. There is no plan so reliable as the tasting of an infusion made of definite strength, by weighing the quantity of tea and measuring the quantity of water. An extract of tea can be made, but the result would be useless, as the fine aroma would be dissipated during the necessary evaporation. Tea contains the principle called theine, similar to caffeine in coffee, and possessed of the same therapeutic properties. Heat, if too great, will volatilize it, as is done daily in the roasting of coffee. Tea can be analyzed and its constituents separated.—E. H. H., of Mass.

J. F. S., query 29, page 314, can prepare litmus paper by taking druggist's white wrapping paper and brushing over one side with a solution of 1 part litmus to 4 parts water. This will make blue paper, to detect acids. For red paper, redden the above solution, carefully, with an acid and use as above. I prefer to take blue litmus paper and hold it over the fumes of nitric or acetic acids, and thus redden it. This avoids all excess of acid, and the paper is more delicate. Any vegetable blue will answer in place of litmus, if you can get a color deep enough.—S., of N. Y.

To J. F. S., query 29, page 314. Make an infusion of litmus in water and a very little alcohol. Use unsized paper. Put the infusion in a flat dish or saucer, and draw slips of the paper through it. If common blotting paper is used, it probably will be an advantage to add a few drops of ammonia to the litmus solution. This will make the blue papers. For red: proceed as before, but add a drop or two of acetic, or dilute sulphuric acid.—E. H. H., of Mass.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Dangers of Car Couplings.—By J. E. S.

On the Force of Steam and the Theory of Heat.—By J. C.

On the August Meteors.—By W. L. D.

On Methods of Ascertaining the Dew Point.—By R. H. A.

Experiments and Suggestions Concerning Automatic Fire Alarm Devices.—By H. M. S.

On the Prognostication of the Weather by Animals.—By J. P. H.

On Sheet Lightning.—By J. H. P.

On a Recent Boiler Explosion.—By J. A. W.

On the Rotation of Movable Wheels.—By J. H. P.

On the Properties of the Concentrated Solar Rays.—By G. R.

On Milk Sickness.—By A. G. P.

On Canal Boat Propulsion.—By L. M. H.

On Car Couplings.—By T. E. B.

On Cylindrical Steam Boilers.—By L. C. S.

On Thunder and Lightning.—By A. E. D.

On Scientific and Mechanical Possibilities.—By J. E. E.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

ROTARY STEAM ENGINE.—Andrew Philp, New York city.—In this invention the cylinder has two long circular recesses in the inner periphery, at opposite sides of the axis, with inclined abutments, said recesses being as wide as the length of the cylinder, and as deep as it is designed that the piston plates, that the steam acts upon, shall project from the disk, which fits in the cylinder as close as it can and revolve freely, and carries the said piston plates in radial slots. The said plates are fitted therein so as to slide out and in and yet not allow steam to escape by passing around them in the slots. The said disk is provided with steam way grooves on one side, and on the other in the corners between the plates, by which live steam is admitted to the recesses behind the plates for propelling the disks. The steam is admitted to these steam ways by the ports on one side and on the other, from the annular steam chests in the disks, attached to the plates which inclose the cylinder at the ends, and to which said chests the steam is admitted by a cock which can be shifted to admit it to either, as required. Steam is also admitted from these steam chambers through the small ports on one side and on the other to the radial slots behind the plates for throwing them out against the walls of recesses. The arrangement of the ports, relative to the recesses, is reversed for the different sides of the engine, the object being to run the engine in opposite directions thereby. There is an exhaust port at each end of the recesses, with a cock for opening and closing them, as required. All discharge into an annular space. The steam, admitted to the radial notches for forcing the plates out into recesses for taking steam therein, exhausts through the small ports, which are arranged equidistant between the ends of recesses, so that they exhaust the said notches, whether the engine runs one way or the other. The inner ends of the plates have little grooves to admit the steam, although the said ends rest on the bottom of the notches. The ports are arranged so that the steam will always enter the notches and recesses when they come to the ports, which are always open and will be cut off when they pass beyond said ports. The steam ways are so arranged, relatively to said recesses, that steam is admitted behind the plates as soon as the said rear corners have arrived at the bottoms of said inclines; and the steam ways will be made any length short of the exhausts, according to the extent it may be desired to work the steam expansively. The exhausts will be alternately opened and closed, according to the direction in which the engine is required to run.

CARPENTER'S WORK BENCH.—Edward Andre and William H. Andre, of Tiffin, Ohio.—The object of this invention is to construct a work bench for joiners, house finishers, and others, which can be much more easily moved and transported from place to place than work benches of ordinary construction; and it consists in a bench that folds up.

FIRE KINDLING COMPOUND.—John S. Carroll, of Covington, Ga, assignor to himself and J. W. Rogers, of same place.—This invention relates to a new composition which is to be applied to wood, coal, or other devices to be ignited, and which can also be used for illuminating purposes on torches or similar articles. The invention consists in combining the following ingredients: plaster of Paris, lard or swine oil, kerosene oil, and Spanish brown or other coloring matter.

CHURN.—Roger Williams, of Yonkers, N. Y.—The invention consists in operating two open frame dashers in the same direction in an oval churn. The two dashers stand with their faces at right angles and always remain so during operation, as they revolve in the same direction with equal velocity. They thereby prevent a continuous current of the cream along the walls of the churn. A faucet for the discharge of milk is applied to the lower part of the churn.

FLYING APPARATUS.—Watson F. Quinby, Wilmington, Del.—This invention relates to a new apparatus for enabling men to fly with the use of side and dorsal wings, which are connected with the extremities for operation. The chief object of the present invention is to support the flying apparatus entirely on the body of the operator, and remove all weight from the arms and legs, so that they will be free to give their entire strength to the operation. The invention consists in a new arrangement of belt and rigid braces for supporting the apparatus on the body; in a new system of stay cords in the several wings; novel method of uniting the wings in front and making them adjustable, and in a new arrangement of cords for connecting the wings with the extremities or exposing them to the action of the same. By grasping certain cords with the hands, and pushing forward and upward, the wings are raised, not fully at once, but gradually, the forward part first, and thence backward, the same as can be observed in the movement of winged animals. By means of the feet, the operator can draw the wings exactly in a reverse to the effect on the same by the hands. The system of upper and lower cords on each side wing is divided into two parts, whence branched cords extend to the uniting rings, thus forming two points of attachment whereby the canting or rolling of the wings will be prevented and a steady motion insured. The rods and branches are principally strained in the direction of their lengths, and can, therefore, be comparatively light. The apparatus is easy to put on, and can, when not in use, be folded together into a comparatively small compass. The weight of the whole machine need not exceed fifteen pounds. The points are the same as those of the bat's wing, except that in the bat the three rods projecting backward are not branched. The rods are then secured in position and the stay cords and covering attached to them. The waist ring may be composed of fellies, like a light wheel, or of thin metal curved so as to combine strength with lightness. The main rods may be composed of bamboo, branches of reeds, or wood, not exceeding an inch and a half in the thickest part, and tapering to a half inch. The small rods are in proportion. The covering (which may be composed of oiled silk or gummed cloth) is secured to the cord which extends all around and connects the points of the rods and stay cords. It is intended to start from the ground. In order to make a beginning, one foot is disengaged from the stirrup, when, by raising the other foot and pushing the hands upward and forward, as in swimming, the wings are raised. Then, by suddenly depressing the wings, by means of the elevated leg, the former are intended to elevate the body by their action on the air. This alternate elevation and depression of the wings is continued as long as flight is desired. After rising from the ground, the other foot may be inserted in its stirrup and both legs used. The actions are intended to be natural, resembling those of swimming in water.

COMBINED WARDROBE AND BEDSTEAD.—Robert M. Austin, of Philadelphia, Pa.—This invention has for its object to improve the construction of the combined wardrobe and bedstead patented June 4, 1872. Suitable appliances hold the side boards from rocking or turning when extended, and at the same time, allow the said side boards to be turned up into a vertical position. To the outer side of the inner end of each of the side boards is pivoted a grooved pulley, which rolls up and down in a groove formed for that purpose upon the inner surface of the sides of the case, the said groove being made dovetailed to keep the said pulley in place while moving up and down. To the inner end of each side board is attached the end of a rope or cord which passes up and is attached to a drum, attached to a shaft, which is pivoted to the upper part of the case. One of the drums is made double, and to its other part is attached a cord, which is weighted, and passes over a guide pulley or pulleys, to bring it into such a position that it may be conveniently reached and operated to raise the side boards To the inner ends of the side boards are attached the ends of another pair of ropes, which pass over guide pulleys to bring them into such a position as to be easily reached and operated to draw the side boards downward, and thus extend the bedstead. When it is desired to close the bedstead the spring slats are pushed along into grooves, and when the bedstead is opened the said spring slats are drawn out of one set of grooves and into others.

ICE CUTTER.—Louis Townsend, of Terre Haute, Ind.—This invention has for its object to furnish an improved machine for cutting ice for packing and for opening a passage for vessels. The frame work which carries the saws is made in T form. A set of circular saws, attached to a shaft, is intended to take the place of ice plows in crossmarking the ice, but they are not intended to cut through the ice. The ends of the shaft revolve in bearings in bars and may be raised out of contact with the ice, or lowered to cut the ice to any required depth, by moving the rear ends of the bars up or down upon screws. The saws for cutting the ice are held forward against the ice by weights connected with the upper parts of the saw by cords. To the under side of the bars of the frame, that run in the direction in which the cutter moves, are attached runners, some of which may be grooved longitudinally to enable them to take a firm hold upon the ice and prevent lateral slip. The cutter frame may be connected with either end of the frame to enable the return cuts to be made without turning the power. To the under side of the longitudinal bars of the frame are attached runners upon which the power moves. Cross runners are pivoted eccentrically to the side bars of the frame so that, when turned in one direction, the said runners may be held free from the ice, and when turned in another direction their faces may project below the runners to support the frame and enable it to be moved laterally to adjust it to make a return trip. The construction enables the power to be placed at a considerable distance from the edge of the ice, and at any desired distance in front of the cutters, so that there may be no danger of breaking through.

MACHINE FOR CROZING AND DRESSING THE INSIDES OF PAILS, ETC.—Richard W. How and Clarence E. Patterson, Brooklyn, N. Y.—This invention has for its object to furnish an improved turning out slide of pail and keg lathe, which shall be easily adjusted for different sized pails and kegs. By turning a shaft in one direction, the crozing heads will both be moved forward into a working position; and by turning the said shaft in the other direction, the said crozing heads will both be drawn back to allow the slide to be withdrawn from the pail or keg. A stop arm projects into such a position that the ends of the staves of the pail or keg, when the slide is moved forward into the said pail or keg, will strike against it and stop the said slide in the proper position for the crozing knives to operate upon the staves, the adjustable crozing heads having been previously adjusted in proper position.

TUB WASHER FRAME.—Butler R. Platt, Plainwell, Mich.—The invention consists in the tub washer frames, which rest upon the top of the tub, to allow of which the tub is grooved to admit the crank shaft. Pins in the bottom of the frame, four inches, more or less, in length, are so arranged that they bear against the outside of the tub to hold it in place. The side and end pieces of the frame are turned, to allow the water to drain off from the frame, and give the same a finished and workmanlike appearance. By means of the pins arranged to inclose the tub, the machine is kept steady and in its proper position when in operation.

PNEUMATIC FIRE ENGINE AND LAWN SPRINKLER.—Henry C. Neer, Park Ridge, N. J.—This invention consists of a stationary or portable tank of sheet metal, adapted to bear great internal pressure, with two pumps arranged within it, and adapted for compressing air, also for injecting water in some cases; the pumps being worked by a foot treadle connection, which is also adapted for the application of a hand crank. The tank is also provided with a funnel with a stop cock for being filled by pouring water in when the air pressure is off, in case it is not convenient to introduce the water by the pumps. The object is to provide a machine which may be kept charged with water and compressed air for use in shops, factories, etc., ready for instantaneous use for extinguishing fires in their early stages, when a small quantity of water will suffice if quickly applied. It is also designed to afford a apparatus, to be moved about on wheels, much better and more convenient for sprinkling lawns than those in which the water is expelled by a pump.

CHAIR, ROCKER, AND LOUNGE, COMBINED.—Henry Haidt, New York city.—This invention consists of a chair in which the back and seat are arranged on a stand or frame so as to rock, or be made fast for either a rocker or easy chair, and the back turns down and unfolds by a joint at the top to form the body of a lounge while the seat turns up to form the head, constituting an easy chair, rocker, and lounge.

COFFIN HANDLE.—Nehemiah Hayden, Essex, Conn.—This invention has for its object to furnish an improved coffin handle, neat, tasteful, and beautiful in appearance, that can be manufactured at small expense; and it consists in the joint formed by the combination of the tube and tips with the ear and end of the arm that supports the hand piece.

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POCKET FOR TRAVELING BAG.—Daniel Read, of New York city.—This invention has for its object to furnish traveling bags provided with an improved outside pocket, designed especially for small traveling or belt bags for ladies' use, but which may be applied with advantage to other styles of bags, and which will add greatly to the beauty of the bag; and it consists in the outside pocket provided with an elastic mouth applied to the outer surface of the bag.

DRIP PIPE TRAP FOR REFRIGERATORS.—Charles Durant, of Jersey City, N. J.—This invention has for its object to furnish an improved trap for the drip or drain pipe of a refrigerator, which shall be so constructed that it may be tilted to clear it of any sediment or other matter that may collect in it, and unless removed obstruct it; and it consists in the combination of a tilting trap with the drain pipe; in the construction of the trap; in the combination, with the drain pipe, of a U-shaped supporting and stop bar; in the combination with the trap of a cross bar or plate; in the combination of a trip rod with the tilting trap; and in the combination of hook hinges with the trap and its supporting bar.

STEAM HEATER.—James J. Smith and Samuel R. Wood, of Cleveland, O.—This invention has for its object to improve the construction of steam heaters. It consists in rectangular cast iron boxes, into which the steam is introduced, and by contact with which the air is heated. In the lower part of the opposite sides of the boxes, near one end, are formed holes, in which are inserted short pipes having a screw thread cut in their inner surfaces. Any desired number of the boxes are placed side by side and at a short distance apart, and are connected together by short pipes, which are screwed into the small first mentioned pipes of two adjacent boxes. The space between each two boxes is inclosed with a case, which has an opening in its bottom near the pipes for the entrance of the air, and an opening in its top, directly over the other orifice, for the escape of the air. A horizontal partition extends longitudinally through the middle part of the space between each two boxes, from the end of the case at or near which the openings are formed nearly to the other end of said box, thus forming a flue and compelling the air to pass twice along the sides of the steam boxes before it escapes. The heater should be surrounded with a box or case fitting closely to it at the sides and ends, but leaving spaces or compartments at the bottom and top. The steam is introduced into the pipe at one side of the boxes, and it and the water of condensation escape through the pipe at the other side.

BACK LASH SPRING FOR MACHINERY.—Hiram W. Bachman, of McLean, Ill.—This invention consists in the employment of two back lash springs for connecting the spindle and pinion of mill gearing or other gearing. The said springs are connected to the collar on the spindle and to the pinion on opposite sides, so as to equalize the bearing of the collar and pinion on the spindle. They thus prevent the wearing of the parts in the localities where the bearings come when one spring is used, which very soon makes such looseness as to cause the pinion and collar to wobble, thus creating back lash even with a spring connection, and making it necessary to frequently refit the spindle pinion and collar.

MODE OF LUBRICATING MACHINERY.—Alexander P. Gross, of Vallejo, Cal.—This invention relates to the application of the principle of the hydrostatic press in the lubrication of journal or shaft bearings of every description. A suction and force pump of ordinary or suitable construction, is connected with the bearings, and its piston rod is curved inward at its outer end so as to enter and work in a cam groove in a circular collar, which is secured on the shaft. The lubricant is contained in a chamber, from which a pipe leads to the pump. To operate the apparatus, the chamber is supplied with oil or other preferred lubricant and the shaft set in motion, which causes the reciprocation of the pump piston through the medium of the grooved collar and the piston rod. By this means the oil is received into the pump cylinder and forced out, whence it spreads laterally beneath the shaft into grooves and returns to the reservoir or passes directly into the said reservoir, according as the shaft is horizontal or vertical.

METHOD OF FORMING SHEET METAL MEASURES.—Jacob Coover, of Chambersburg, Pa.—This invention relates to a "new way" of constructing dies so as to graduate the form of a standard measure, not only to an aggregate cubical quantity, but also to aliquot parts thereof, and it consists in a conical male die, having a lower section of a cone, the solid contents of which equal one gill; then a horizontal projecting shoulder formed by another sectional cone resting thereon, whose solid contents also equal one gill, but together with the preceding are equal to one half pint; the next section of a cone is equal in solid contents to one pint: and so on, according to the desired aggregate size of the vessel. A female die, correspondingly constructed, allows it to fit nicely therein. A conical tube is then formed of suitable size, placed the female die, and staved up. The bottom is then applied thereto and the top finished in the usual manner.

WASTE PIPE TRAP.—Thomas Smith, New York city.—This invention is an improvement on the waste pipe trap for which a patent was granted to the above inventor June 18, 1872, No. 128,077, which said trap consists of a box with a hinged valve or gate in it, introduced between two sections of the pipe, so that the waste passes under the free end of the valve to the escape pipe, the said valve being to stop the wind gusts which sometimes blow up from the sewers and blow the water out of the water traps above, so that the gases from the sewers escape into the houses. The said trap is designed to be used as auxiliary to the water trap. The inventor now proposes by having the waste pipe leading into the trap enter at the bottom instead of the top, as heretofore, so that its mouth will always be submerged, which was not so before, to make this a water trap, also to effectually shut off the gases from the sewers, as well as a gate or valve trap, to stop the aforesaid wind blasts, which gases leak or escape through the joints of the valve above the water in the trap.

WROUGHT IRON PIER FOR BRIDGES.—Theodore B. Mills, Iola, Kansas.—This invention consists in the construction of piers, columns, or abutments of iron for bridge supports, etc., of four double T bars stepped in metal pockets or foot rests on the foundation, at suitable distances apart at the bottom, and converging upward toward a common center for bracing properly with a metal cap, to which all are connected at the top; said cap being also a seat for the bridge shoe, to which cap the posts or bars are connected in a novel manner. They are also braced at suitable intervals between the top and bottom with horizontal and diagonal braces. The posts are arranged with their greatest transverse diameter in lines radiating from the center, toward which they converge in the upper part for having the greatest strength in the direction of the greatest pressure. Two of these columns or piers are used for one abutment, being placed side by side at a suitable distance for supporting the sides of the bridge, and connected together at the top. The sides are covered with planks extending horizontally between the posts or bars, fitted into the grooves between the flanges, and secured binding plates or bars running lengthwise of the posts and bolts.

CASTER FOR TABLES.—Henry A. Hiestand, Hellam, Pa.—This invention consists of a pair of bars for each side of the table or other article, on which two of the casters with long shanks are mounted, so as to have an ascending and descending motion. The bars have hooks with adjusting nuts, so arranged as to be readily detachably connected to the legs of the table. On the upper bar a pair of levers is pivoted and arranged for lifting the table by bearing on the caster spindles at one end when the other end is raised. The latter ends of each pair are connected with a yoke, pivoted to a crank or eccentric disk on a shaft mounted on the under side of the table top and extending from one side to the other for operating the levers at both sides at once. When the table is raised off its legs and thrown on the casters, the point of connection of the yoke with the disk passes beyond the vertical line of the axis of the shaft and brings the yoke to bear against the shaft in such manner as to be self fastening. The table is thus held on the casters, so that no time or labor is lost in fastening and unfastening the apparatus.

SHEARS.—Charles Gudehus, of Hoboken, N. J.—This invention consists of a lever and spring combined with a shears in such manner that, as the blades close in cutting and the point of resistance shifts toward the points of the blades and increases by moving from the fulcrum, the force will be transmitted from the handle directly to or nearly to the point of the upper blade through the said lever and spring, so as to greatly lessen the labor of cutting through several layers of cloth. The arrangement is also such that, as soon as the force of the hand by the blades are forced together is relaxed at the handles, the spring will throw the blades open again, and thus greatly relieve the hand of the operator of a difficult part of the labor.

[OFFICIAL.]

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For which Letters Patent of the United States were granted.

FOR THE WEEK ENDING OCTOBER 29, 1872, AND EACH BEARING THAT DATE.

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On each Trade-Mark	$25
On filing each application for a Patent (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
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Wringer, clothes, J. H. Park	132,687
Wringing machine, A. Burbank	132,628

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter named.

22,775.—COTTON PRESS.—Z. Atkinson. January 15, 1873.
22,786.—HARVESTER.—C. G. Dickinson. January 15, 1873.
22,787.—STOVE.—P. Dodge. January 15, 1873.
22,792.—MACHINE FOR MAKING WOODEN TROUGHS.—S. T. Field. Jan. 15, 1873.
22,802.—MILL FOR GRINDING CANE, ETC.—I. A. Hedges. January 15, 1873.
22,809.—BAKER'S OVEN.—G. C. Jennison. January 15, 1873.
22,841.—HARNESS SADDLE TREE.—S. E. Tompkins, J. Maclure. January 15, 1873.
23,001.—ELASTIC TOY.—L. P. Porter. January 29, 1873.

EXTENSIONS GRANTED.

13,897.—GIMLET.—C. C. Tolman.
16,814.—CIRCULAR SAWING MACHINE.—C. P. S. Wardwell.
21,828.—FURNACE FOR TEMPERING STEEL.—P. G. Gardiner.
21,917.—HULL OF STEAM VESSEL.—R. and T. Winans.

DISCLAIMER.

16,814.—CIRCULAR SAW MACHINE.—C. P. S. Wardwell. 1872.

DESIGNS PATENTED.

6,220 & 6,221.—CARPETS.—T. Barclay, Lowell, Mass.
6,222 to 6,225.—CARPETS.—R. R. Campbell, Lowell, Mass.
6,226.—CARPETS.—J. M. Christie, Brooklyn, N. Y.
6,227.—CARPETS.—J. Hamer, Lowell, Mass.
6,228.—COFFIN HANDLE EARS.—N. Hayden, Essex, Conn.
6,229.—PENCIL CASE.—E. S. Johnson, Jersey City, N. J.
6,230.—CARPETS.—D. McNair, Lowell, Mass.
6,231 to 6,234.—CARPETS.—E. Perrin, Kidderminster, England.

TRADEMARKS REGISTERED.

1,040.—MEDICINE.—J. S. Coleman, San Francisco, Cal.
1,041.—SMOKING TOBACCO.—C. R. Messinger, Toledo, O.
1,042.—PREPARED PLUMBAGO.—Morse Brothers, Canton, Mass.
1,043 to 1,045.—CORSETS.—Ottenheimer, Rothschild & Co., New
1,046.—TAGS AND LABELS.—C. S. Schenck, New York city.
1,047.—EMERY WHEELS, ETC.—The Tanité Company, Stroudsburg, Pa.

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Value of Patents,

AND HOW TO OBTAIN THEM.

Practical Hints to Inventors.

PROBABLY no investment of a small sum of money brings a greater return than the expense incurred in obtaining a patent even when the invention is but a small one. Larger inventions are found to pay correspondingly well. The names of Blanchard, Morse, Bigelow, Colt, Ericsson, Howe, McCormick, Hoe, and others, who have amassed immense fortunes from their inventions, are well known. And there are thousands of others who have realized large sums from their patents.

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This is the closing inquiry in nearly every letter, describing some invention which comes to this office. A *positive* answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

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This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

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The patent may be taken out either for five years (government fee or $20) for ten years (government fee $40) or for fifteen years (government fee $60). The five and ten year patents may be extended to the term of fifteen years. The formalities for extension are simple and not expensive.

American inventions, even if already patented in this country, can be patented in Canada provided the American patent is not more than one year old.

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Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing MUNN & Co., 37 Park Row

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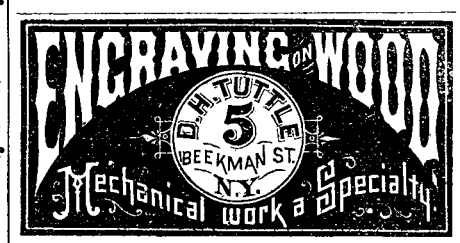

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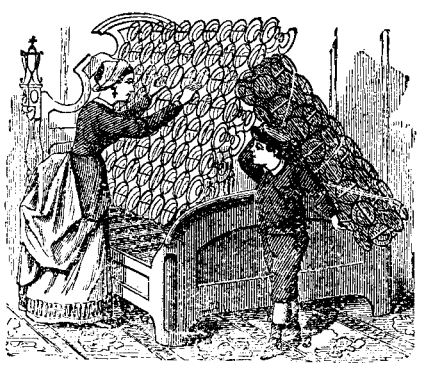

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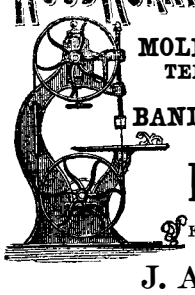

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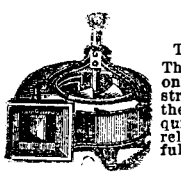

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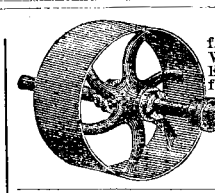

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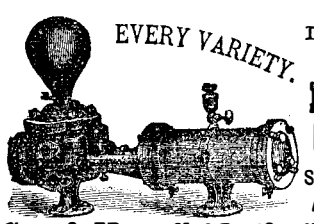

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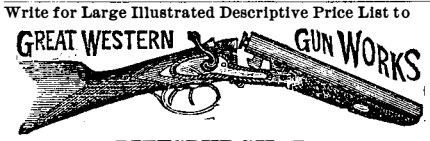

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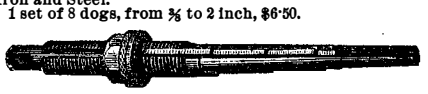

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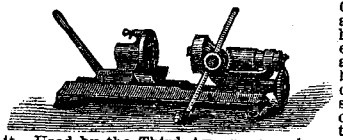

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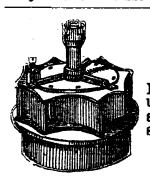

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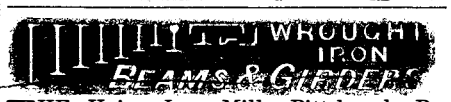

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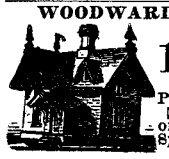

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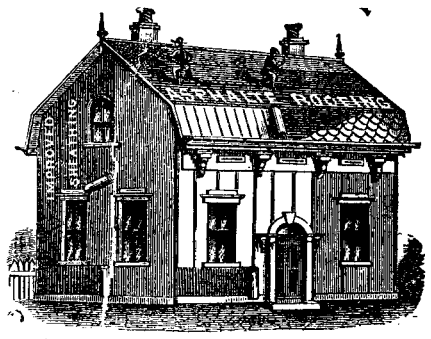

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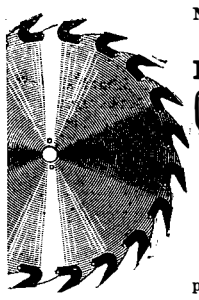

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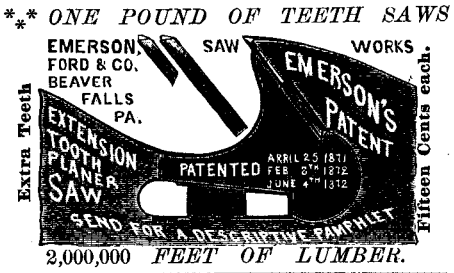
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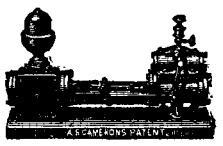

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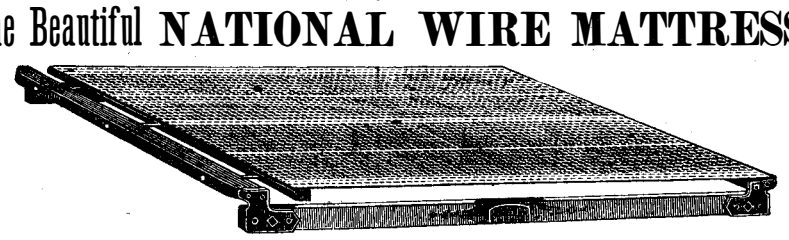

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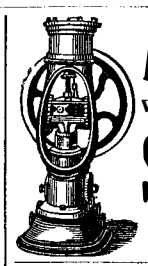

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